Doctoral Dissertation

Transformative Service System Model for Healthcare Services Access in a Limited Resource Context

資源限定状況下における医療サービスアクセス向上のための変革的医療サービスシステムモデルの研究

Toufiq Ahmed

Supervisor: Associate Professor Kunio Shirahada

School of Knowledge Science

Japan Advanced Institute of Science and Technology

December 2017

Abstract

In the past two decades, the world has seen tremendous changes in service economy, especially in the world's most advanced economies countries. In advanced countries, it has estimated that the service sector contributing 70% to their GDP which finally influences individual and collective Well-being. On the other hand, though the service output is increasing in emerging economies, but still it is lower than the global average. Therefore, service research and implementation are required there in developing countries to foster GDP's growth as well as individual and collective Well-being.

Researchers and scholars have been focusing service and service system research on its trends, challenges, diversion, dynamism, neglecting of service and service implementation process from the developed country perspective where vast resources are common. In this perspective, provided service is called knowledge-based service. Knowledge based service is well integrated with two important components. These components are the technological intervention with service and development of skilled workforces in service system. On the other side, the unequal distribution of knowledge in developing countries leads to unequal economic growth and well-being there where limited resources contexts are the barrier. Surprisingly there is a fundamental lack of service research in a limited resource context. Therefore, service research in a limited resource context is required.

In a limited resource context, services cannot afford by government alone. Public, private, and non-profit organization provides services, collaborate with each other's and improve well-being of citizens'. Along with government services, therefore it is important

that non-profit organization provide effective service in a transformative way to increase the overall well-being of the communities and employees. To do so, non-profit organizations needs to develop, retain and sustain their skilled employees and improve their well-being as well.

A study in a limited resource context offers new grounds deriving five services research streams. Transformative service research (TSR) is one of them. TSR is aimed to improve well-being of individual, families, communities, collectives, and ecosystems. In service organization, well-being of employees is much more important to ensure better and quality services to be provided. Healthcare services provided by non-profit organization is one of the important transformative services in the developing countries perspective. Thereby, healthcare service is selected as the transformative service research for the present study.

The healthcare services in a limited resource context are associated with mountainous problems. These are including severe shortage of human resource for health, lack of access to healthcare service especially in rural and urban slum areas, lack of healthcare knowledge among service providers and recipients as well, and quick changes of technology uses in healthcare service provision. In addition, developing and retaining human resource for health in the healthcare system in a limited resource context is one of the major problem to provide continuous healthcare services. Due to these limitations, primary healthcare services are affecting to provide quality healthcare services and improving well-being as well. Therefore, healthcare service system need to consider innovative solution to create efficient and affordable services.

To provide innovative solution for healthcare service system and improving well-being in a limited resource context, the study adopts two important field of research concepts. The first one is transformative service research and the second is knowledge transfer in knowledge management concept. Therefore, the study aims to identify (1) factors affecting to retain human resource for health in healthcare service system, (2) factors affecting to transfer healthcare knowledge, and find out how healthcare knowledge transfer facilitates healthcare services access and improving well-being as

transformative value in a limited resource context. The concept of transformative service research (TSR) and process of knowledge transfer in knowledge management cycle are applied to develop a healthcare knowledge transfer model in a limited resource context. Therefore, finally the study aims to develop a model for transformative service system for healthcare services access in a limited resource context.

A qualitative semi-structured interview method was applied to achieve the main objectives. Two kinds of analysis process have been performed because of contributing to uncover novel causal factors, open new areas of research and result in more holistic thinking about health. This methodological approach is suitable for this study because, the nature of this study was to investigate about the work, life, careers, and challenges that employees are faces during work of service employees of healthcare services in a limited resource context.

The findings of study 1 revealed that BRAC uses a micro-credit system to support the provision of Shasthya Sebika in areas with limited resources. The Shasthya Sebikas share healthcare knowledge with the residents and earn money by selling medicine to them. They are not employees of BRAC. They are therefore motivated to work as well as to improve the health of people in their community. On the other side, 'Shasthya Karmis' are used mobile Health (mHealth) to transfer healthcare knowledge. The first way was the acquisition and provision of healthcare information, and the second was the keeping of patient records in the mobile-based computer system. In addition to providing support during home visits, the Shasthya Karmis' provide support through their mobile phones. Residents can contact them if they face difficulties with their health. Such support was made possible by the implementation of BRAC mHealth, a service used to keep client records and to build a comprehensive healthcare database, thereby providing point of healthcare services to community residents.

Finally, the study proposed 'transformative service system model for healthcare services access in a limited resource context' which can serve as a starting point to develop business and service strategies for access to healthcare services efficiently in a limited resource context with technological advancement and can be extended beyond the healthcare setting. The transformative service system model for healthcare services access should help to improve healthcare organization's human resource management,

knowledge management in healthcare organizations and improve healthcare services access as well.

Keywords: Healthcare, Healthcare Services, Knowledge transfer, Shasthya Sebika, Shasthya Karmi, BRAC HNPP, Limited resources, well-being

Acknowledgements

All praise to Allah, lord of the world and entirely merciful who guided us to the straight path. I owe enormous debt of thanks and gratitude to Almighty Allah, who provided me enough patience, strengths, blessings and answering my prayers throughout my doctoral journey and in my entire life. Without His kindness and mercy, I would not have been able to finalize my PhD dissertation.

It has been adventurous but wonderful journey for studying PhD and writing doctoral dissertation in Japan Advanced Institute of Science and Technology (JAIST). During this journey, I have met with many interesting peoples, scholars and practitioners that I haven't in my entire life before. It would not have possible without their active support, guidance, warm affectionate and help. I thank you all.

Firstly, I would like to express my deepest and heartiest gratefulness to my honorable supervisor Associate Professor Dr. Kunio Shirahada for his kind-hearted scholarly supervision, guidance, hand-to-hand teaching, and support in all ways that motivated and helped me to overcome the barriers happened during my doctoral research and dissertation writing. It is my good fortune to have him as my PhD supervisor. Without his scholarly guidance and support, I would not have concluded my research project. I have been influenced and improved my research maturity from his scholarly criticism, guidance, and encouragement. I would like to express my sincere gratitude to my co-supervisor Professor Dr. Michitaka Kosaka for his cordial support, kind cooperation and encouragement during my research activities.

I would like to extend my gratitude and thankfulness to all professors in JAIST who taught me during my doctoral study through their intellectual lectures. I would like to convey my special thanks to all members of Shirahada lab for their kind cooperation by providing intellectual taught, comments and suggestions during lab seminar that helped me to well-shaped my research idea. My heartiest thanks and gratitude to my minor research supervisor Professor Dr. Susumu Kunifuji. Without his cordial cooperation, guidance and motivation, I would not have finished my minor research

project. I am thankful to the department of Information Science and Library Management at the University of Dhaka in Bangladesh for their kind acceptance as a visiting research student in their department.

I would like to convey my gratitude to Dr. Tapash Roy, program head of BRAC Health, Nutrition and Population Program in Bangladesh as well as his colleagues who made the work easier to collect data for my doctoral research from rural areas and urban slum areas in Bangladesh. Their kind cooperation made it possible to collect data.

I am very much grateful to all members of the dissertation examination committee who evaluated my doctoral dissertation. Their scholarly comments, advices and suggestions during my defense helped me to think and nurture research theories and models in depth. It would not have possible to improve my dissertation quality without their kind cooperation, advice and suggestions.

This study was financially supported by the Ministry of Education, Culture, Sports, Science and Technology (Monbukagakusho) Honors scholarship, Mitani Foundation scholarship, and Research Promotion Award (RPA) of JAIST, Japan. I am deeply grateful to these institutions/organizations for their financial support to carry on my doctoral research.

Finally, I would like to express my heartiest gratitude to my family members. First and foremost, I am very much grateful to my parents Mohammad Rafikul Hoque and Jubeda Begum. Their everyday prayers always directed me in the right path and help me to go ahead. In the same time, I am grateful to my eldest sister Dr. Nasima Akhter and her husband Dr. Sufi Ahammad Hassan for their greatest contribution in my life which made me think different as well as helped me to step forward. I am very much grateful to my wife Irin Jahan who accompanied me throughout the study period and always motivated me to go ahead. Her unconditional support, love and encouragement helps me greatly to continue my doctoral research. My gratefulness to my son Arfan Ahmed who have had sacrificed his most of wonderful moments without me in his childhood. I would like to thank to my loving family for their sacrifices, support and understanding me always. I would like to extend my thankfulness and gratitude to those I have missed to mention here who kept me in their prayer, and supported me by their encouragements.

Contents

List of Figures

List of Tables

Chapter 1 Introduction

1.1 Background

Better healthcare service is not only a key element of human happiness and Quality of Life (QoL), but also determinants of changing people's lives (Sweeney et al., 2015). Therefore, a well-functioning healthcare service system is needed. Such a system requires a well-trained and adequately-paid workforce, well-maintained health facilities and technological support for delivering healthcare services at the point of time when the patient needs them. Therefore, attention should pay to healthcare services are needed in all countries around the globe.

Healthcare in developing countries in particular faces a number of challenges, including critical shortage of healthcare workforce, insufficient healthcare infrastructure, and low income per capita. The World Health Organization estimated that 4 million more health workers were needed in 2012 to resolve the shortage and that most of the shortages were in developing countries, resulting in higher mortality rates for mothers and children (World Health Organization, 2006). Sustainable development goal 3, which was recently announced by the United Nations (United Nations, 2015), aims "to ensure healthy lives and promote well-being for all at all ages". Such goals are difficult to achieve due to the shortage of health workers. Therefore, developing countries with limited resources need to redesign their healthcare services system in order to address the human resource for health challenges.

Knowledge has been recognized as a unique source and key elements of

sustainable economic development and improvement of human well-being over the last decade (Nonaka and Takeuchi, 1995; World Bank, 1998). However, in most of developing countries, the unequal distribution of healthcare knowledge, which leads to unequal economic growth and health well-being (World Health Organization, 2004). To improve the situation of poor healthcare knowledge distribution, its services system should be considered to understand significantly what knowledge, how and who are providing to customers in a pluralistic environment.

With the rapid changes of technological innovation since late 20th century, there has been tremendous improvement of healthcare services delivery systems in the world. This technological revolutionary change has been adopted and intervene in the worldwide. Therefore, the technology giving the opportunity to well-function the healthcare delivery service systems in order to improve human quality of life and well-being. These technological innovations facilitating the access to healthcare services in multiple ways. For example, technological intervention helping to deliver quality and point of healthcare services to those who are far from healthcare service areas, in remote areas, and among difficult to reach. In addition, this technology based healthcare service approach can become more accessible to service recipients by reducing time and cost of travel (Nadim et al., 2010). Among other technological innovations in healthcare, mobile phone technologies are being developed, used, and intervene with human resource for health (Braun et al., 2013). Healthcare services delivery through mobile phone is called mHealth. Multiple mHealth intervention strategies have been applied for improving healthcare services and outcomes worldwide. In a review study (Klasnja and Pratt, 2012) identified five key intervention strategies and these are 1) tracking health information, 2) involving the healthcare team, 3) leveraging social influence, 4) increasing the accessibility of health information, and 5) utilizing entertainment. These strategies are actively providing healthcare services based on patients need and demands.

Implications of mHealth service provision to provide healthcare services in developing countries could be thought as the better way of alternative healthcare services (Motamarri et al., 2012). It has become most prominent way of health service delivery tool in a cost effective way in developing countries as they are integrating mobile phone with healthcare service delivery system (Istepanian and Lacal, 2003). In addition, mhealth services have identifies as an interactive and personalized healthcare service which aim

to provide universal access to healthcare services to any users at any time at any place (Akter et al., 2013). Therefore, the availability of mHealth services changing the healthcare service delivery pattern by reducing time, cost and proximity (Sukkird and Shirahada, 2015).

Most of existing mHealth services model were developed for direct customers' benefits. For example, the Arua district in Uganda, a project named "*the text to change"* have been implemented for its rural residence. The aim of the project was to increase the opportunity to acquire information on HIV/AIDS, collect data about it, and promote HIV/AIDS counselling and testing among residents in the district (Chib et al., 2013). Similar campaign has been found in other developing countries such as "*pregnancy care advice by SMS*", and "*mobile phone health services*" implemented by the directorate general of health service (DGHS) under the ministry of health and welfares of Bangladesh (World Health Organization, 2011a). However, previous studies have never tried to clarify how mobile-based healthcare knowledge transfer could contribute to improve access to healthcare services and well-being.

1.2 Statement of the problem

From the background of the study, we came to know that, healthcare sector in developing countries are facing many challenges including severe shortage of human resource for health, insufficient healthcare infrastructure, lack of healthcare competencies among service providers, and low income per capita. In addition, challenges from the patients' sides such as socio-demographic factors including women's education, lack of knowledge on basic healthcare management, and lack of knowledge on family planning are also great barriers to provide quality healthcare services. Due to these limitations, primary healthcare services are affecting to achieve the goals set by United Nations and countries itself. More particularly, the sustainable development goal (SDG) 3 has recently been announced by United Nations in 2015 (United Nations, 2015), which aim "to ensure

healthy lives and promote well-being for all at all stages". These goals would be difficult to achieve due to these challenges facing in developing countries.

Healthcare sector facing the treat of new technology adoption and produce new services due to lack of technological skill. To address these challenges, healthcare service delivery system need to consider innovative solution to create efficient and affordable service. Managing and transferring the knowledge of service provider to recipients in order to improve quality of life can address these challenges to offer as innovative solution. We believe that by identifying motivational factors affecting to retain human resource for health can be affording to provide healthcare services to unreached and unserved patients.

Retaining human resource for health and healthcare knowledge transfer from technology aspect could lead to bring transformative outcomes of improving healthcare service access and well-being. Combining these two concepts, we frame the problem from theoretical view of transformative service research and applying knowledge management (knowledge transfer) can lead to toward a transformative service system which tend to improve healthcare services access as well as well-being in a limited resource context.

1.3 Research objectives and research questions

Based on the challenges of severe shortage of human resource for health and lack of competencies among human resource for health, there is need to identify and develop transformative healthcare service system model to improve access to healthcare service delivery and well-being through providing an innovative solution in a limited resource context.

The first objective is to identify factors affecting to retain human resource for health in healthcare services in a limited resource context. The second objective is to identify factors affecting to transfer healthcare knowledge, and to find how healthcare knowledge transfer facilitate access to healthcare services and well-being as transformative value in a limited resource context. The concept of transformative service

research (TSR) and process of knowledge transfer in knowledge management cycle are applied to develop a healthcare knowledge transfer model in a limited resource context. The third objective is to develop a model for transformative healthcare service system in a limited resource context.

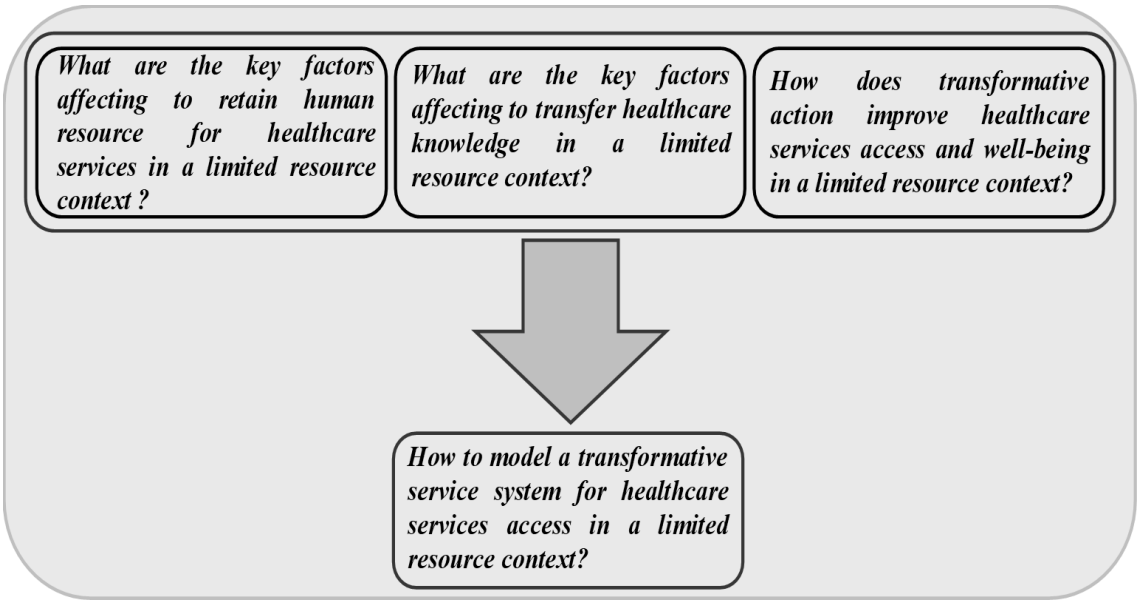

Figure 1-1 Overview of research questions for transformative service system model for healthcare services access in a limited resource context.

Major Research Question (MRQ):

How to model a transformative service system for healthcare services access in a limited resource context?

Subsidiary Research Question (SRQ):

SRQ 1: What are the key factors affecting to retain human resource for healthcare services in a limited resource context?

SRQ 2: What are the key factors affecting to transfer healthcare knowledge in a limited resource context?

SRQ 3: How does transformative action improve healthcare services access and well-being in a limited resource context?

1.4 Significance of the study

The problems of healthcare services in a limited resource context are associated with lack of access to healthcare services in rural and urban slum areas, lack of healthcare knowledge among healthcare service providers as well as among recipients, and quick changes of the technology uses in healthcare service provisions. Knowledge transfer in healthcare service provision can identify appropriate healthcare knowledge what patient community want and ensure accessible services and improve well-being by transferring healthcare knowledge among rural and slum residence.

Through exploratory and qualitative in nature, the present study has revealed that healthcare organization motivates its health workers in its program and improves its service quality by providing healthcare knowledge transfer through an effective knowledge transfer system which designed to improve the quality of life in rural and slum areas. The healthcare organizations provide healthcare knowledge to health workers through training and workshops that useful for rural and slum residence. The collective well-being has improved by making awareness, perceived usefulness and apply this knowledge to rural and slum residence.

The proposed healthcare knowledge transfer framework and model for access to healthcare services in a limited resource context in healthcare service provision will bring certain benefits and lead to provide quality, effective and affordable healthcare services to rural and slum areas. Healthcare service practitioner and policy makers may become aware about key factors to retain health workers in healthcare service system and healthcare knowledge transfer based on technology in the healthcare service provision under limited resource context. A model toward access to healthcare service system in a limited resource context is a major feature of the present study break the new ground where relatively have paucity of research.

The present research could help both academic, practitioners and policymakers to advance and understanding the relationship between human resource for health, technological uses in healthcare service provision and well-being outcomes in healthcare services. Therefore, the present study is of significance to healthcare services under

limited resources for improving access to healthcare services, reducing healthcare knowledge gap and improving well-being in the rural and slum areas.

1.5 Structure of the study

The dissertation is structured into Seven chapters which are 'Background Introduction', 'Literature Review', 'Research Methodology', 'Factors affecting to retain human resource for health in a limited resource context', Factors affection to transfer healthcare knowledge and improving well-being in a limited resource context', 'Transformative healthcare service system model' and 'Conclusion, Implications and Limitations' as shown in figure 1-2. A brief explanation of each chapter is providing in the following sections.

'Chapter 1: Background and Introduction' is the introductory chapter contains the research background of healthcare services and challenges regarding the shortage of human resource for health in developing countries. It discusses about healthcare knowledge transfer, mHealth and improving well-being. The chapter also consists of research problem, research objectives and questions, and a general idea of the dissertation.

'Chapter 2: Literature review' introduces the literature with wide range of contents about the service, service system, concept of transformative service research, human resource management, knowledge management, knowledge transfer, technology based healthcare services and knowledge transfer and challenges.

'Chapter 3: Research Methodology' is about research methods used in each study conducted and enclosed in the dissertation.

'Chapter 4: Factors affecting to retain human resource for health in a limited resource context' is the first study identifies factor which facilitate to retain human resource for health in a limited resource context. His chapter sheds light on many important topics including about BRAC and BRAC healthcare service system, BRAC health workers 'Shasthya Sebika' and finally presented findings on how BRAC able to

retain human resource for health in the healthcare services system.

'Chapter 5: Factors affecting healthcare knowledge transfer and improving well-being in a limited resource context' is the second study identifies factors affecting healthcare knowledge transfer, and to find how healthcare knowledge transfer facilitate access to healthcare services and well-being as transformative value in a limited resource context. The study sheds light on healthcare knowledge transfer through mobile technology and well-being as transformative value. The chapter also consists a healthcare knowledge transfer model in a limited resource context.

'Chapter 6: Transformative healthcare service system model' aims to propose transformative healthcare service system model in a limited resource context.

'Chapter 7: Conclusions, Implications and Limitations' includes answer for research questions, implications and limitation of the study.

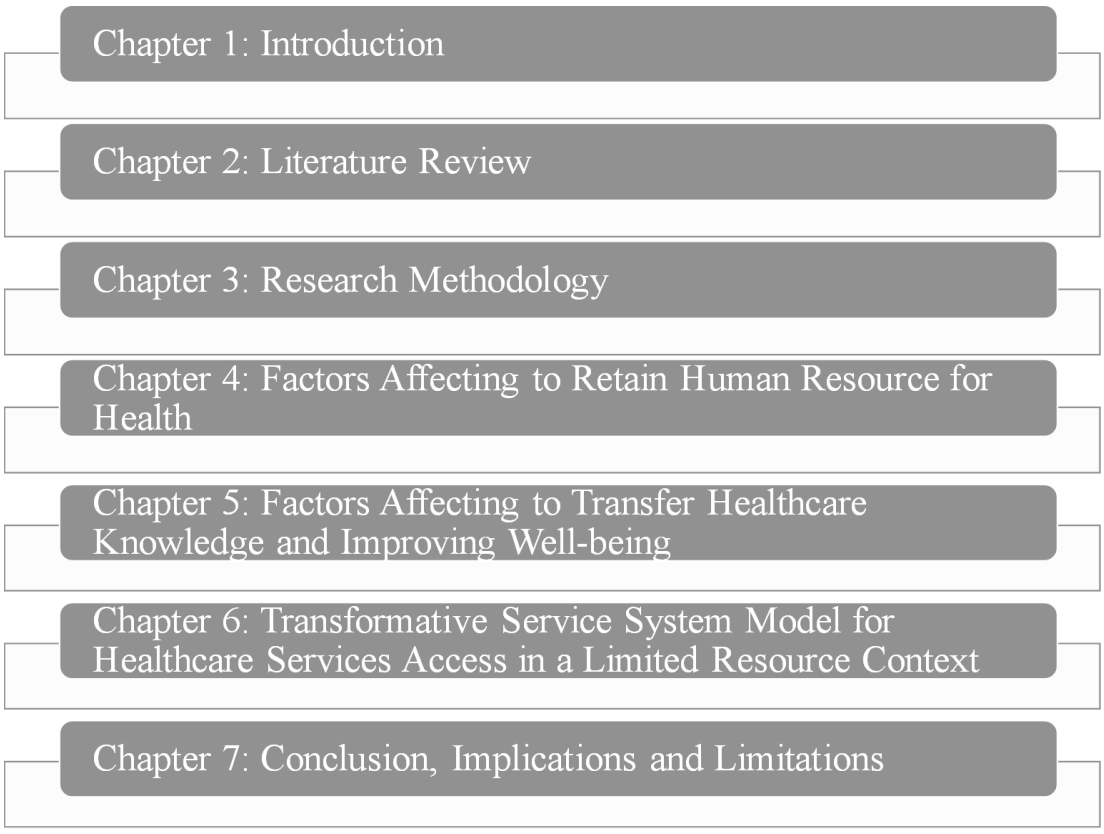

Figure 1-2 Structure of the study

Chapter 2 Literature Review

The aim of this chapter is to find out the research gaps from existing literature and make a position of the present study in the context from the perspectives of service system, human resource management, and knowledge transfer.

2.1 Service system perspective

2.1.1 The concept of service system

The term ‘service’ was first used in the 1930s, which arose from the US Department of Commerce’s Standard Industrial Classification to indicate the domestic economic activities (Fisk et al., 2013). Service defines by the American Marketing Association, Committee of Definitions (1960, p. 21) as “activities, benefits and satisfactions, which are offered for sale or are provided in connection with the sale goods”. This definition shows the basic characteristics services; such as Intangibility, Heterogeneity, Inseparability, Perishability.

However, there is a need to see a service from the perspective of system. This is because service includes the process that providers and recipients interact, offer benefits and create values for each other by using people’s knowledge and skills (Vargo and Lusch,

2004). Grönroos (2008, p. 300) also stated service as, “a process that consists of a set of activities which take place in interactions between a customer and people, goods and other physical resources, systems and/or infrastructures representing the service provider and possibly involving other customers, which aims at assisting the customer’s everyday practices”. Consider an example of dental clinic service where service package includes interaction between dentist and patients, existing goods and physical resources (dental instrument, nurses or health assistant and clinic room where the service take place) and doctors skill which satisfy the patient being cured. In this perspective, services are not constant itself. It should change based on time, place and people’s performance. According to above definitions, service can be thought as a process, having interaction between two parties, both parties will have benefited by using their skill and competencies, thereby doing their best performance in a competitive environment and provide superior value to service recipients.

Service system is a system which describes how services can be delivered to customers who wish to get it. Cardoso et al., (2015, p. 12) identified “a service system consists of elements (e.g., people, facilities, tools, and computer programs) that have a structure (i.e., an organization), a behavior (possibly described as a process), and a purpose.” In the modern service science, the understanding of service system is developed based on the principles of value co-creation. Maglio and Spohrer (2008, p. 18) stated that, “a service system as a dynamic value co-creation configuration of resources, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by value propositions”. It indicates an integrated process with people, organizations, resources and technology which facilitates value co-creation that have dominated in developed economies. The definition of service systems is provided in the table 2-1.

Some of service systems are transformative by design and some of are potentially (Reynoso et al., 2015). Because, Reynoso et al., (2015) reported that transformative services create and promote social relationships and networks aiming to improve well-being among people, groups and communities. Therefore, it is important to address well-being related to healthcare service providers in a limited resource context. The focus on well-being of communities of healthcare service system has been gaining importance in the field of transformative service system. Transformative service system promoting

human well-being among individual and collectives. The concept and nature of transformative service system described in the next section.

Table 2-1 provides a list of latest definitions of service system. (Source: Adapted from Barile and Polese, 2010).

Definitions of Service System	Authors	Year
Service systems represent value co-creation configuration of people, technology, value prepositions connecting internal and external service systems, and shared information (e.g., language, laws, measures, and methods), like an assemblage of unites entities by some form of regular interaction or interdependence.	Spohrer, Maglio, bailey and Gruhl	2007
Service Systems can simply be a software application, or a business unit with an organization, from a project team, a business department, a global division; it can be a firm, institution, government agency, town, city or nation; it can also be a composition of numerous collaboratively connected service systems within and/or across organizations.	Qui, Fang, Shen and Yu	2007
Service systems act as resource integrators, understandable in terms of elements of a work system, within the organization and through the network enduring resource specialization, those operands and operant, such as knowledge, skill, know-how, relationship, competences, people, products, money, etc.	Spohrer, Anderson, Pass and Ager	2008
Every service system is both a provider and client of service that is connected by value prepositions in value chains, value networks, or value creating systems.	Vargo, Maglio and Akaka	2008
A service system is any number of elements, interconnections, attributes, and stakeholders interacting in a co-productive relationship that create value, in which principle interactions take place at the interface between the provider and the customer.	Spohrer, Vargo, Maglio and Caswell	2008

Table 2-1 Continued

Definitions of Service System	Authors	Year
A service system primarily relates to customer-provider interactions as well as open system with it being capable of improving its own state and the one of another system though acquiring, sharing, or applying resources, with the aim of creating a basis for systematic service innovation.	Golinelli	2008
Service systems are a complex interplay between from and customer that form an open system which needs to be designed using the techniques of viable systems and systems dynamics, in which both parties are focused on achieving outcomes.	Ng and Maull	2008
Service system can be divided into "front stage" (about provider/customer interactions) and "back stage" (about operational efficiency) and service performance relies on both of them, putting people (customers and employees), rather than physical goods, in the center of its organizational structure and operations. The smallest service system is a single person; the largest one is represented by the global economy. A service system essentially is a social-technical system, focusing on engineering and delivering services using all available means to realize respective values for both provider and customer.	Qiu	2009
Service systems can be represented as real networks, in which the same entities combine their strengths through direct and indirect connectivity, as they are oriented toward enduring competitiveness and daily interactions with other external interdependent service system.	Polese	2009

2.1.2 Defining the concept of well-being

The research interest on Well-being has been growing in recent decades among scholars (Bradley, 2015; Diener et al., 1999; Kahneman et al., 2003; King et al., 2014; Ryan and Deci, 2001). Therefore, many scholars have attempted to define the well-being from various perspectives. It has been well recognized that the well-being is a multidimensional concept and consisting in what people do such as having a good job, expressing their political voice, or having freedom to choose (Stiglitz et al., 2010; Sukkird, 2016).

Bradley (2015) discussed about the subject of well-being in his prominent book named “well-being” and concluded that the concept of well-being usually focusses on human well-being. The definition of human well-being is not clear though there have been abundant literatures mentioning the most of its characteristics (McGillivray, 2006). However, human well-being is a concept which refers to peoples positive attitude being satisfy in their life having “intellectual origin in philosophy, psychology, economics, political science and other discipline” (Hall et al., 2013, p.13). Therefore, the terms of quality of life, well-living, welfare, life satisfaction, living standard, etc. could be used to understand well-being in specific phenomenon and context (McGillivray & Clarke, 2006).

Since the concept of human well-being is abstract, it cannot be measured accordingly. It could be conceptualized which has been transformed time to time. It also can be shifted from one aspect to another; such as economics to non-economics. Thereby, there is no acceptable definition of human well-being (Diener et al., 1999, 1999; King et al., 2014). Indeed, “well-being is intangible, difficult to define and even harder to measure” (Thomas, 2009, p.11). However, the concept of well-being has broadly defined, “the objective components of well-being include many material and social attributes of people’s life circumstances such as physical resources, employment and income, education, health, and housing. In contrast the subjective components of well-being are represented as individual’s thoughts and feelings about one’s life and circumstances, and the level of satisfaction with specific dimensions” (King et al., 2014, p.683).

Shed light on above position, it can be conceptualized that the human well-being is a broad concept that can be measured from multiple dimensions. Health is one of them which refers to actual physical health of individual (Judge et al., 2010). The World Health Organization defines health is “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (World Health Organization). Thereby the level of individual’s well-being can be affected by the status of individual’s health. For example, peoples living with diseases doesn’t enjoy the full of well-being. In contrast, people living with diseases free can enjoy the well-being. In this present study, the total well-being of rural and slum residence accounted their positive changes in health condition through the improvement of healthcare service accessibility; changes from ‘lack of access’ to ‘access’ and changes from worst condition to better condition.

2.1.3 Transformative service system for well-being

Ostrom et al., 2015 indicate the future service research priorities in the service field. According to that, service scholars will advance the field's borders by making best contributions to practice, theory and societal well-being within the new technology-enabled, interconnected, and global context.

Improving human well-being is a big challenge for service providers (Rosenbaum and Smallwood, 2011), which has given rise to a new research field known as transformative service research (TSR). TSR is a research domain that seeks the relationship between service and well-being. TSR represents research agenda that focuses on creating uplifting changes and improvements in the well-being of consumer entities, individuals and eco-system (Anderson et al., 2013). The authors provide a framework for service research priorities where transformative service research agenda took place in the strategic research priority pane as improving well-being through TSR. Given the priority on TSR, scholars have identified wider space of future research focusing on the quality of service provision and the ways to improve both individual and collective well-being (Anderson et al., 2013; Rosenbaum & Smallwood, 2011).

TSR is a way to explore services as a driver of societal change to advance well-being for both individuals and collectives (e.g., families and communities); and, enhancing access to critical services (e.g., health care and education) and bring transformative outcomes for both (consumers and providers). Examples of service system with input resources, transformation and transformative outcomes provided in the table 2-2. In the context of TSR, attempts to understand well-being across different service phenomena including financial (Martin and Hill, 2015; Winterich and Nenkov, 2015), healthcare (Spanjol et al., 2015; Sweeney et al., 2015; Yao et al., 2015; Zayer et al., 2015), religion (Blocker and Barrios, 2015), multiple industries (Mirabito and Berry, 2015) and politics/government (Skålén et al., 2015) services have highlighted the system, community, organization and individual well-being outcomes. These researches facilitates our understanding the wide range of services phenomena including negative service and the relationship with well-being, the role of collectives in affecting well-being and consumer activities in service delivery which affects their well-being directly

(Anderson and Ostrom, 2015).

There have been studies on saving and financial satisfaction improving consumer's well-being in a limited resource context (Martin and Hill, 2015). The study discovered that the saving improves individual well-being even under conditions of higher poverty. As societal poverty increases, the positive effect of saving on well-being increases. Regarding the financial well-being, Gao et al. (Guo et al., 2013) examined how consumers can engage in behavioral change counselling service in order to enhance well-being. The study revealed that consumer's participation in service production, delivery and development could lead to socialize consumers and improve their own well-being and also result in higher satisfaction (Guo et al., 2013). Therefore, consumer's participation is important to achieve the goal of improving well-being. One of the core areas of transformative service research is healthcare service. Research on health well-being has getting priorities among academic and policy makers (McColl-Kennedy et al., 2012).

Table 2-2 Examples of service systems with input resources, transformation and transformative outcomes. Source: Adopted from Fromm and Cardoso (2015, modified).

Name of service	Provider's resources	Customer's resources	Transformation	Transformative
Hairdressing Service	Facilities (shop, chair, mirror), tools (scissors, combs, brushes), materials (shampoo, conditioners, colorant), competencies (skilled in hairdressing), hairdresser.	Customer him or herself.	Changes in hairstyle.	customer's Well-being
Car Service	Facilities (garage, lifting ramp), tools (wrench, hammer, screw, driver), materials (spare parts, oil), competencies (skilled and educated in in car repairing), mechanic.	Customer's car	Changes car in good condition	Car owner's well-being
Healthcare Service	Facilities (hospital, operating rooms) Instruments (stethoscope, syringe) Materials (medicaments, plasters, dressings, disinfectants) Doctors, nurses, paramedics, administration	Customer (patient) him- or herself	Changes in health condition	Patients well-being
Electronic Service (e.g., stock report)	Computing infrastructure with internet connectivity (web server) Software application (web application) (No human resources)	Customer him- or herself Internet access device (personal computer, smartphone)	Change in level of information	Well-being of internet users
Education Service	Facilities (school/college/university, classrooms) Instruments (chair, table, digital board, multimedia) Materials (books, articles, lecture handouts) Teachers, staffs	Customer (students) him or herself	Getting education and gain skills & competencies	Well-being of students

2.1.4 Transformative service system in healthcare services

Transformative value has defined as a social dimension of value creation that generates individual and collective well-being (Blocker and Barrios, 2015). For instance, healthcare service research is considered as one of the emerging field of TSR where

service provider and recipients can contribute individual and collective well-being through a process. Sweeny, Danaher, and McColl Kennedy (Sweeney et al., 2015) argue that, customer effort in value co-creation activities have a direct impact on satisfaction with the expecting service which improves quality of life. The authors analyzed patient activities across chronically ills such as cancer, heart disease, and diabetes disease settings. The study findings show that patients activities within and outside the clinics are enhances individual quality of life.

Transformative value could generate from and in human and technology mediated healthcare services. For example, transformative value in healthcare have found in rural communities of Alaska in the United States of America (Charlesworth et al., 2016). Government and nonprofit healthcare organizations providing 'customer driven' healthcare services through community health aids and community health practitioners (Golnick et al., 2012), health information technology (Lee et al., 2013), and NUKA system of care. Nuka system of care has been developed Southcentral Foundation at Alaska in the USA. The word NUKA is an Alaska Native word used for strong, giant structures and living things. The Nuka system of care is built upon three simple beliefs: customer ownership, relationships, and whole system transformation. The mission of Nuka care system is to work together with the Native Community to achieve wellness through health and related services (Gottlieb, 2013). All these innovative approaches increased access to primary healthcare service delivery from 35% to 95%, reduced the number of individuals on behavioral health wait list from about 1300 to nearly zero in a year, and increased 25% of childhood immunizations. All of these transformative value improves collective well-being among Alaska native peoples (Gottlieb, 2013).

In other healthcare related studies, Yao, Zheng, and Fan (Yao et al., 2015) investigated well-being output through online social support which is important rout to improve stigmatized patients' (hepatitis) healthcare conditions and generates hepatitis patients' well-being. Similar study has investigated the role of social support perception and emotional well-being on online information seeking among breast cancer patients and found positive outcomes of emotional well-being (Kim et al., 2013).

Prior studies have investigated the effort of customer value co-creation activities, online social support, and health information technology effort on individual well-being outcomes such as improving individual quality of life. The most important issues on

enhancing access to critical services has been overlooked under the umbrella of TSR (Ostrom et al., 2015) Therefore, it is requiring to pay attention to investigate the most pressing issue on improving access to healthcare services in the limited resource context. In particular, co-creation action in terms of knowledge and human resource in healthcare service is more important for improving well-being in developing countries with limited resources. Transformative service research about healthcare are insufficient in limited resource context in terms of knowledge and human resource to do a co-creation for making transformative value.

Peoples living in rural areas in developing countries where access to healthcare services are difficult due to limited resources. Considering the limited healthcare resources, the most effective support comes from volunteer health workers and improve health well-being among rural peoples affecting HIV/AIDS (Campbell et al., 2008). This volunteer service may facilitate access to healthcare services for HIV/AIDS patients and improve well-being among them.

In recent years, online social support has emerged in healthcare communities. Yao et al. (Yao et al., 2015) examined the detail effects of four categories of online social support on physical, psychological, and existential quality of life. The study findings show that the impact of emotional support on psychological quality of life is most effective. It means, the impact of emotional support from online supporter facilitates to improve psychological well-being. However, these previous researches have argued that providing overall effective support through volunteer health workers and emotional social support from online supporter may contributes improving disease specific and psychological well-being as healthcare outcomes. But, only limited studies tried to shed light on how healthcare knowledge transfer contributes to improve healthcare well-being of rural and slum residence in a limited resource context.

The problem in a limited resource context is to access healthcare services when patients need. Therefore, understanding the co-creation action in terms of knowledge and human resource in healthcare service which makes easy access to healthcare services as transformative value for the unreached and underserved peoples over other healthcare facilities is needed.

2.2 Human resource management perspective

2.2.1 Human resource management and organizational outcomes

Empirical evidence confirmed that why and how human resource management (HRM) ensure organizational outcomes through the effective use of human resource (HR) practices. Conventional HRM research has focused on the impact of HR practices on individual and organizational performance. Research has demonstrated that HR practices and, interpersonal and system trust lead to employee satisfaction, organizational commitment, and organizational performance (Gould-Williams, 2003). In an effort to clarify the relationship between HR management and organizational performance, several studies have explored multiple mediating paths and differentiated the effects of three dimensions of a HR system (skill-enhancing HR practices, motivation-enhancing HR practices, and opportunity-enhancing HR practices) on organizational performance (Jiang et al., 2012). In addition, industry capital intensity, growth, and differentiation have been found to affect the impact of HR systems on productivity (Datta et al., 2005).

These studies have shown that, the more that HR practices are in place, the more HR management outcomes are standardized, which significantly affects performance (Teclemichael Tessema and Soeters, 2006). Above these studies are conducted from the organizational perspective. Although several studies are extended the scope and examined the effects of HR management and HR practices at the organizational level in developed countries where tangible and intangible economic and infrastructural resources are available. Unconsciously the relationship between HR management and organizational outcomes in developing countries in a limited resource context are remained unexamined. Therefore, the main focus of this study is HR management in a limited resource context where tangible and intangible economic and infrastructural resources are limited.

Firms and organizations operating in a limited resource context often pay low wages as a means to reduce costs and do not realize the need for HR development (Budhwar and Debrah, 2006). Therefore, the healthcare sector, and hospitals, in a limited

resource context are experiencing a shortage of skilled health workers. Despite the strong evidence for positive outcomes for HR management through the effective use of human resources in hospital settings, important issues were remained regarding the challenges to HR management and creating skilled workers in the healthcare sector (Cooke and Bartram, 2015).

Some researchers are argued for a link between HR management and patient mortality. West et al., (2002) revealed a strong relationship between HR practices and patient mortality in a hospital setting. They suggested that extensive training and appraisal systems and teamwork motivation may significantly affect hospital performance. In line with these findings, the behavioral aspect of HR management practices is positively related to levels of employee engagement, and engagement has been shown to mediate the link between motivation and self-reported individual performance (Alfes et al., 2013). Moreover, HR practices such as training and development, occupational health and safety, and HR planning facilitate effective participation and engagement in the organization (Cavanagh et al., 2013). In contrast, creating sustainable employment opportunities for the unemployed in healthcare services and HR management in the healthcare sector is a big challenge. Given the importance on these challenges, several strategic approaches have been proposed such as employer engagement in skill development (McBride and Mustchin, 2013) and creation of an appropriate system for education having national and organizational levels (Cooke and Bartram, 2015).

2.2.2 Work motivation and healthcare services

Human resources play an important role in changing work practices in healthcare organizations. In a recent study McBride and Mustchin (2013) demonstrated that, “lack of capacity in terms of time and resources was a key factor that limited the development of an expanded role for HR that would have allowed them to be central actors in regulating changing work practices”. This means that management needs to increase capacity and improve capabilities if it wants to add value to service provision. Although there is a big debate in the literature regarding employees’ perception of the value added by HR

management to service provision. A recent study revealed a positive relationship between the management competencies of the employees' HR staff and their perception of the value added, though the perception is mediated by the perceived quality and nonmonetary costs of HR management services (Meijerink et al., 2016).

In line with the literature, the study focuses on the role of employee motivation. On the one hand, as previous research has suggested, three domains (skill, motivation, and opportunity) should lift up emotional performance, which affects customer service (Gabriel et al., 2016). Gabriel et al., (2016) posited that, "motivation-enhancing HR practices are more critical in jobs where a strong link exists between emotional performance and financial reward". In addition, key observations of the 'black box' of an HR system showed that a strong following by hospital personnel of their supervisors' motivational efforts positively affects performance (Boxall et al., 2011). On the other hand, research has empirically determined the role of non-financial incentives in motivation and found that they have a positive effect on the motivation of healthcare professionals (Mathauer and Imhoff, 2006).

HR management in a service-based organization needs to create a workplace that facilitates employee retention and promoted the provision of high quality services. A recent study suggested that, it is necessary to first develop an attractive workplace environment in order to meet the personal and organizational goals of healthcare professionals (Mathauer and Imhoff, 2006). A further study conducted in a hospital setting in a different region obtained evidence confirming that workplace empowerment creates a work environment that fosters professional nursing practice and promotes job satisfaction, which encourages nurses to remain and provide safe, high-quality health care in hospital (Laschinger et al., 2003). Therefore, motivation is important for HR practices.

Ryan and Deci (2000) has distinguished the different types of motivation based on the goals that motivate one's to go for an action. These are intrinsic and extrinsic motivation. Intrinsic motivation is defined "as the doing of an activity for its inherent satisfactions rather than for some separable consequence" (Ryan and Deci, 2000, p.56). Intrinsic motivation is a kind of motivation which allow person to learn and explore, and usually do not require extra incentives to do so. Because, intrinsic motivation motivates peoples to accumulate knowledge and skill. Extrinsic motivation which mainly refers to activities that is driven by external rewards such as money, reputation, grades, and praise.

Extrinsic motivation arises from outside the individual, as opposite to intrinsic motivation, which originates inside of the individual.

However, there have been few studies on the link between HR and motivation in healthcare service delivery in a limited resource context. This study addressed this shortfall by conducting two empirical studies enclosed in chapter 3 and chapter 4.

2.3 Knowledge management perspective

2.3.1 The nature of healthcare knowledge

Information and Knowledge is very closed to each other. Information is the pre-form of knowledge. According to Bose (2003), "well-managed information that is properly cataloged and structured, available and accessible by the right people and processes at the right time becomes knowledge". Knowledge cannot create itself, it created by human interaction. Nonaka et al. (1994) reported in their work that the knowledge can be classified into two types; explicit and tacit knowledge. Explicit knowledge can express in words and communicated in linguistics. On the other hand, tacit knowledge is difficult or cannot be express in words and communicated through human interaction. It means, tacit knowledge is difficult to capture, it can realize more which supports Polanyi's (1967) argument that "we can know more that we can tell".

From above arguments, healthcare knowledge can be classified as explicit and tacit (Cheah and Abidi, 2001). The explicit healthcare knowledge is included knowledge that acquired from evidence-based medical literature, reviews, healthcare training and workshops, case studies and clinical practices. On the other hand, tacit healthcare knowledge is including knowledge that acquired from healthcare experts' skill, clinical experience, judgement and intuition.

Clinical decision-making is a complex task and depends on the healthcare

knowledge and skills of healthcare service providers. Abidi (2008) has identified a variety of healthcare knowledge that directly contribute to clinical decision-making and care planning. These are including patient knowledge, practitioner knowledge, medical knowledge, resource knowledge, process knowledge, organizational knowledge, relationship knowledge, and measurement knowledge. However, it must be recognized by service providers in order to secure the longer-term of well-being of rural and slum residence in a limited resource context.

In line with the discussion of above literatures, the nature and characteristics of healthcare knowledge in the context of present study can be summarized as follows-

Healthcare service recipient's knowledge: Patient's knowledge refers to the health condition of the patient that healthcare service provider can understand what kind of disease or complexities are associated with his/her health. Patient's knowledge drawn by healthcare service provider and documented in the register book as well as recorded in the medical record in order to get a complete picture of a patient.

Healthcare service provider's knowledge: Tacit healthcare knowledge gain through practices and exercised while providing healthcare services to its recipients. Healthcare service provider's knowledge is acquired through training, workshops, observations and experiences.

Medical knowledge: Medical knowledge is the main knowledge domain of healthcare service delivery and treatment. In the context of present study, this area of knowledge is including prenatal and postnatal care, child nutrition, identify tuberculosis and basic healthcare management.

Resource knowledge: Resource knowledge indicates knowledge about existing resources in the healthcare service setting. Healthcare service providers should have up-to-date knowledge about healthcare resources that they can decide the right path of treatment to be provided (Abidi, 2008). These areas of knowledge are including medical diagnostic tools, medicine availability, appropriate number of stuffs, and healthcare service infrastructures.

Organizational knowledge: Abidi (2008) reported that the organizational knowledge indicates the knowledge transfers from one source to another and signify the healthcare service team members role in terms of healthcare knowledge flows within the organization.

Relationship knowledge: Relationship knowledge is a knowledge that make a network among organization, healthcare providers in the community and individuals. According to Abidi (2008), relationship knowledge entails communication mechanism and contacts between multiple stakeholders for the purpose of healthcare knowledge transfer among patients communities.

Measurement knowledge: Measurement knowledge indicates the scale of success of a healthcare service delivery. Measurement knowledge is important to measure the outcomes of knowledge management action in healthcare delivery services.

The nature of healthcare knowledge analysis illustrates that the types of knowledge may be used to organize and transfer healthcare knowledge among rural and slum residence that they can learn more about healthcare. These types of knowledge may help decision makers to decide.

2.3.2 Concept of knowledge management

Knowledge is the most important and revenue-generating resources for any organizations (Grant, 1996), and has more significance than other tangible assets (Shirahada et al., 2015). Therefore, knowledge threated as the core elements of knowledge management (KM). Before exploring the implication of KM, it is obvious to clarify what is knowledge in general and in the context of this study. Knowledge is defined by many scholars in their scholarly work from different perspectives. Knowledge is neither data nor information but related with both. The data is a fact about events and it transforms into information and in the same way information into knowledge. Davenport & Prusak, (1998; p5) views "knowledge derives from minds at work" and defined "Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information". Knowledge often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. Knowledge is intangible and cannot be seen. It absorbs from courses, mentors as well as informal learning and develops over time through experiences and practices

(Nonaka and Takeuchi, 1995). In the healthcare context, dialogue of knowledge is extremely important which is ignored in previous researches. In healthcare services, data is collected from patients and their family history, patient's height, weight, blood pressure and medication history etc.

Knowledge is a central intangible asset of a service based organization which improves organizational performance through creation, share, transfer, use, reuse, and disseminate knowledge (Nonaka and Takeuchi, 1995). Knowledge management (KM) deals with all of these things in an organization. KM is an emerging issue started and popularized in the business and academic world since late 1980 (Dalkir, 2005). In recent year, KM became more important in the economic activities and threated the current economy is 'knowledge economy'. As an interdisciplinary field, KM has been practiced by a number of research fields such as in Business and Management, Information Technology Management, Philosophy, Cognitive Science, Artificial Intelligence and Organizational Studies (Dalkir, 2005; EI Morr and Subercaze, 2010).

The interest and practices of knowledge management in organizations are increasing as the primary source of economic development. In addition, KM is justified belief for increasing the capability of organizational acting performance (Nonaka, 1994). Therefore, KM is recognized as an important tool for gaining competitive advantages and a firm can become more innovative and can increase its performance capability through the proper management of knowledge (Darroch, 2005; Nonaka and Takeuchi, 1995). Davenport (1994) defined KM as the process of capturing, distributing, and effectively using knowledge. This definition is simple and cannot be provide wider range of information about KM. A year later, Nonaka and Takeuchi (1995) provided another definition which is covered has elaborated more concisely and defined KM as the "capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services and systems". The goal of KM is to create and disseminate knowledge in-between organizations and facilitate to improve organizational performance. Research evidence suggested that the quality of customer solution can be improved and become more customer oriented through enabling knowledge management practices within organization (Goh, 2002). KM practices is required in and within healthcare organizations in order to improve the capability of healthcare service accessibilities and as well as service quality.

KM could provide strategic advantages to organization in a competitive environment. To do so, organization need to identify what knowledge can be generated, acquired and transferred to get the competitive advantages. In healthcare organizations, knowledge has traditionally managed by human resource as healthcare organizations are very far from the creation and implementation of artificial intelligence in general (Darroch, 2005). Therefore, KM can be taught as a cycle of creation, transfer, share, access and application of knowledge within and between healthcare organizations. Dalkir (2005) reviewed and proposed integrated KM cycle from existing studies and validated in real-world settings. Figure 2.3 indicating an integrated KM cycle which covers three stages: 1) knowledge capture and /or creation; 2) knowledge sharing and dissemination; and 3) knowledge acquisition and application. We modified 'knowledge sharing and dissemination' into 'knowledge sharing and transfers' as dissemination could be interpreted to be similar to transfer and adopt these stages of the integrated KM cycle shown in the figure 2-1 for drawing to tools in this present study.

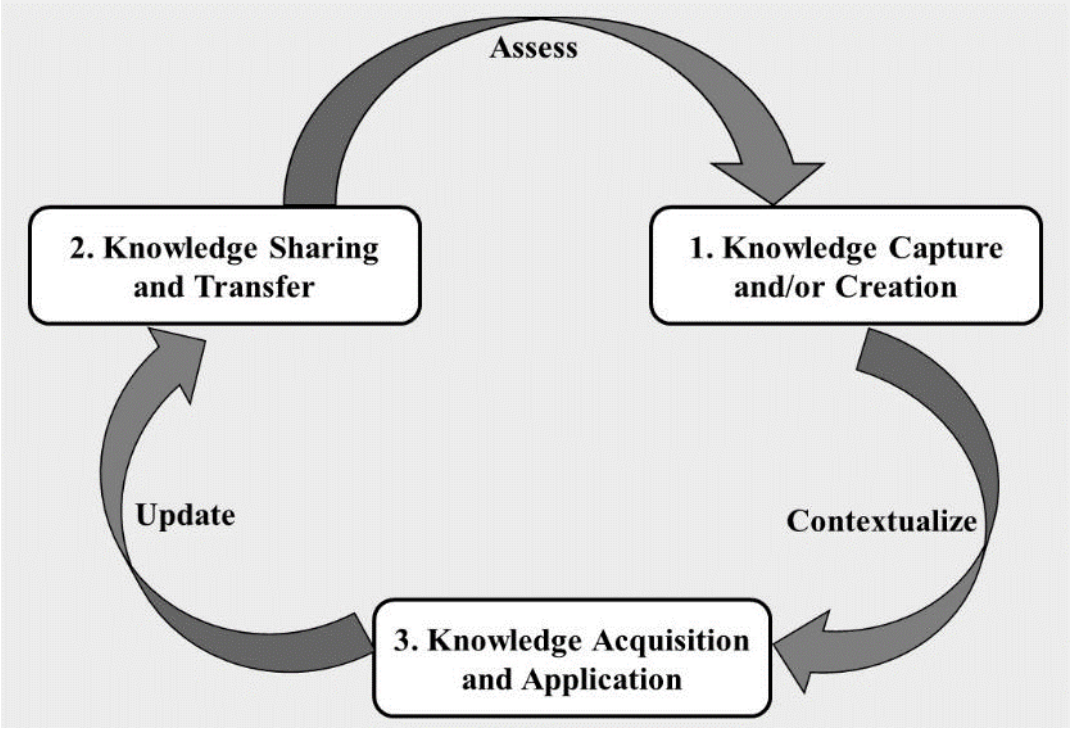

Figure 2-1 A modified integrated knowledge management cycle (Adopted from Dalkir, 2005).

The interest and practices of knowledge management in business organizations has been increasing as the primary source of economic development. Research evidence suggested that the organizational performance and quality of customer solution could be improved and become more customer oriented through enabling knowledge management practices within organizations (Palacios Marqués and José Garrigós Simón, 2006). Through the knowledge management practices and the effective utilization of knowledge resource can contribute towards improving customer satisfaction and firms performance (Chawla and Joshi, 2010; Nonaka et al., 2008).

In a recent review of empirical research on knowledge management practices, Inkinen (2016) categorized into four category of knowledge management practices based on literature and point out that the each category enhances firm performance. These are; 1) human-oriented knowledge management practices, 2) technology-oriented knowledge management practices, 3) Organization-oriented knowledge management practices and 4) Management process-oriented knowledge management practices. These knowledge management practices are highly influential factors and linked with firm performance outcomes (Inkinen, 2016).

A number of researchers and practitioners have been discussed the relationship between human resource management and knowledge management in business literature. In a study, Andreeva and Kianto (2012) has shown that the human resource management practice is important for managing organizational knowledge and knowledge management can be used to influence the company's bottom-line directly. In line with this findings Palacios Marqués and José Garrigós Simón (2006) reported that the relationship between the adoption of knowledge management and firm performance is strong and positive. Therefore, human resource management is important driver to manage organizational knowledge resources and firm performance outcomes.

The aim of knowledge management practices is to manage knowledge as an asset, creating knowledge repository, creating a network of knowledge workers, and improving employee to employee communication, train newly recruited employees, and facilitate sharing & transferring knowledge through direct or technology mediated contact (Andreeva and Kianto, 2012; Dalkir, 2005; Davenport and Prusak, 1998; Yahya and Goh, 2002). The recent advancement in information technology significantly affects the knowledge management practices in knowledge-based organizations.

2.3.3 Mobile technology for healthcare knowledge transfer

Knowledge transfer is the process of movement of knowledge from one place to another, changes ownership from one person to other and improve recipients' knowledge level. Knowledge is intangible, and it cannot be transferred itself. Knowledge is always embedded with place and when it separated from place, it transformed into information (Nonaka and Konno, 1998). Effective knowledge transfer is important in healthcare (Metelska et al., 2011) Although these studies have provided effective management lenses for organizational management, knowledge transfer is an inter-personal process and led by individual members of the firm. This is relevant to the importance of face-to-face communication in knowledge transfer process (Almeida and Kogut, 1999). Effective and positive outcomes have been found in face-to-face and person centric knowledge transfer in healthcare services.

Goh (2002) pointed out that the development of a high level of trust is important for creating collaborative organizational culture and sharing knowledge. Fink and Ploder (2009) pointed out that human interaction to foster new and innovative knowledge cultivates organizational knowledge sharing culture. These studies focused on interactive human relationships and pointed out that they are needed for knowledge transfer (Argote et al., 2003). Regarding relationship element in transferring knowledge, Minbaeva, (2007a) demonstrated that the degree of knowledge transfer is higher when close relationships have been established between senders and receivers. Kachra and White (2008) also demonstrated that know-how transfer is more effective when close relationships have been established.

Research on knowledge transfer in healthcare has examined the importance of having a knowledge transfer strategy for human well-being. For example, EISAI pharmaceutical company in Japan encourages their employees to spend one percent of their working time with local patients, transferring and sharing their healthcare knowledge in order to prevent and cure illness (Nonaka and Peltokorpi, 2006). Sherif (2006) found that successful knowledge transfer depends on the individual transfer ability of knowledge senders and receivers. However, there have been very few studies on knowledge transfer for well-being output in the limited HR context.

The aim of knowledge transfer for an organization is to satisfy end users. But, and front-line employees are responsible to do it effectively. Therefore, front-line employees have to capable to access and transfer it to customer community effectively. However, question that, which mode can be facilitated knowledge transfer at the individual level? Recent researches has been focused on information and communication technology (ICT) and a constructive debate raised that mobile phone technology could help to improve communication and diagnostics to community level providers to provide effective and efficient services including healthcare knowledge transfer. Liyanage et al., (2009) argued that, successful knowledge transfer means how successfully new knowledge acquiring and assimilating by the recipient unit. Research has shown that, the knowledge transfer is a two-way process and degree of knowledge transfer is higher when a close relationship has been established between knowledge senders and receivers (Minbaeva, 2007b). With the rapid advancement of ICT, mobile phone (mHealth) could take place as enabler of healthcare knowledge transfer process. Thus, the present study taking about knowledge transfer through technology which aims to improve health well-being and QOL patients.

The mHealth is defined as "mobile computing, medical sensor, and communications technologies for health care" (Istepanian et al., 2004). It has become most prominent way of health services delivery tool in a cost-effective way in developed and developing countries. It uses mobile telecommunication and multimedia technologies as they are integrated within increasingly mobile and wireless healthcare delivery system (Istepanian and Lacal, 2003). Research identified that, mHealth applications is the better alternative healthcare service in developing countries (Motamarri et al., 2012). We can define mHealth services as a healthcare services through mobile devices; mainly mobile phones in order to enhance access to healthcare services, transfer healthcare knowledge such as healthcare information, improve distribution of routine and emergency health services, or provide diagnostic services. In developing countries, the availability of pervasive technologies such as the internet and mobile phones changed healthcare market by reducing cost, time, geographical distances, and making service process easier than ever (Sukkird and Shirahada, 2015).

The application of mHealth differs from country to countries. Based on the existing services, mHealth services can be categories into two; one is the interaction

between health system and public, and the other one is interaction within health system itself. These services can be viewed from the viewpoint of business to consumer (B2C) and business to business (B2B) perspective. Most of existing mHealth services model were developed for direct customers' benefits. For instance, the Arua district in Uganda, a project named "*the text to change*" has been implemented. The aim of the project was to increase the opportunity to acquire knowledge about HIV/AIDS, collect data about it, and promote HIV/AIDS counselling and testing among residents in the district (Chib et al., 2013). Similar campaign has found in other developing countries such as, "*pregnancy care advice by SMS*", and "*mobile phone health services*" implemented by the directorate general of health services (DGHS) under the ministry of health and welfares of Bangladesh (World Health Organization, 2011b).

In Ghana, there have severe shortage of healthcare professionals. It has estimated that, only two thousand medical doctors are providing healthcare services to 24 million populations (World Health Organization, 2011b). The Ghana Medical Association (GMA) launched the Mobile Doctors Network (MDNet) in 2008. It provides free mobile-to-mobile voice and text services to GMA registered physicians. The MDNet is the first initiative in Africa and aims to promote the transfer of knowledge among physicians in Ghana through mobile phone. Physicians in Ghana can access information regarding specialists, bed availability, and clinic times, facilitating the referral of patients to higher levels of care. Result reported that, practitioners living in district and rural areas are gradually acquiring knowledge on the management of complex medical cases through mobile devices.

In recent year, mobile phone technology diffusion has happened across the world much more rapidly than any other technology diffusion. The world mobile cellular subscriptions has reached 96.3 per 100 people in 2014 (The World Bank, 2015). In developing countries, for instance, the percentage of individuals used mobile phones is 76.0 percent which indicates the rapid growth of mobile subscribers in Bangladesh (The World Bank, 2015). In contrary, poor peoples are in Bangladesh often facing difficulties in accessing quality healthcare services due to inadequate healthcare infrastructure, shortage of healthcare workforces, and most importantly lack of healthcare knowledge. Therefore, it is necessary to improve healthcare services within existing facilities in an innovative way, and mobile phone technology could be the possible solution to improve

health communication and can help health providers to improve the services they provide (El Arifeen et al., 2013).

Regarding healthcare knowledge transfer in healthcare sector, there are studies from different levels such as public health decision makers (Dobbins et al., 2004), physicians for clinical practices (Rosser, 2008), hands-on-training from researchers to pathologists (Molfenter et al., 2009), and inter healthcare institutes (Forrester et al., 2008). However, there are a paucity of research about technology mediated healthcare knowledge transfer to the community level where access to healthcare services are still inadequate in a limited resource. Therefore, present study will contribute to fill the gap by investigating the impact of technology mediated healthcare knowledge transfer in improving access to healthcare services and health well-being in study area.

Chapter 3 Research Methodology

3.1 Introduction

A qualitative semi-structured interview method was applied to achieve the main objectives which are to identify factors affecting to retain human resource for health and to identify factors affecting to transfer healthcare knowledge and improving well-being in a limited resource context. Finally, the study aims to propose a conceptual model for access to healthcare service system that helps to improve providing healthcare services and well-being as a whole in a limited resource context. To answer the three sub-research questions and one major question, this study applies qualitative research approach and performed two kinds of analysis process because of contributing to uncover novel causal factors, open new areas of research and result in more holistic thinking about health (Curry et al., 2013). This methodological approach is suitable for this study because, the nature of this study was to investigate about the work, life, careers, and challenges that employees are faces during work of service employees of healthcare services in a limited resource context.

3.2 Study Area

3.2.1 Limited Resource Area

'Limited Resource' refers to the inadequate resources or resource scarcity or resource constraint means that the quantities of productive resources available to the economy are finite. For example, developing countries reportedly lacks of resources, which has led to failure in the access to public services including education and healthcare services (Fuglsang, 2010). Resources are the tangible and intangible assets that firms use to develop and implement their strategies which is particularly important for new services development (Ray et al., 2004; Witell et al., 2017).

Providing better healthcare services are depending on the availability of resources such as physicians, nurses and hospital bed. Physicians are the heart of the health service delivery system in any country. Nonetheless, the severe shortage of physicians in developing countries have been neglected over the decade. The density of physicians and hospital bed per population are much lower in developing countries than the developed countries. For example, the number of physician per 1000 population in African region is 0.21 where Americas 1.94, Eastern Mediterranean 0.74, Europe 3.2, Southeast Asia 0.52 and in the Western Pacific 1.1. The global average is 1.23 per 1000 population. The number of physicians per 1000 population in Bangladesh is 0.389, three times lower than the global average which is indicating the 'limited human resource' in the health sector in Bangladesh. Therefore, the development of human resource for health need to be upgraded in the health sector in Bangladesh.

At the national level, developing countries are account for 90% of the global burden of disease where they can spend only 12% global spending on health. The average health expenditure per capita in developing countries is about $30. On the other hand, developed countries spend about 100 times more than on health per capita than developing countries. The average health expenditure per capita in developed countries is about $3039. Health expenditure per capita in Bangladesh was $30.83, hundred times

lower than the global average which is indicating the 'limited financial resource' in the health sector in Bangladesh. Therefore, the development of human resource for health need to be upgraded in the health sector in Bangladesh.

'Limited Resource' areas are often indicating the areas or countries where peoples are living under poverty, are called Base of the Pyramid (BoP) market. Recently, there has been growing research interest on BoP market. The concept of BoP refers to the large group of populations who live on less than $2.50 a day, unserved or underserved, and often ignored and lack access to many goods and services (Linna, 2013; London, 2008; Prahalad, 2006). Healthcare services are one of them that they are often failing to access healthcare services due to lack of resources including shortage of human resource for health, lack of healthcare knowledge among healthcare service providers and recipients, and lack of healthcare infrastructures in rural and slum areas.

The cases where we focused on 'limited resources' are fitted the definition above mentioned. Service research from limited resource perspective is very close to my research. The present research is a case study conducted in a limited resource area.

3.2.2 Selection Criteria of Study Area

Mymensingh, Fulbaria and Bhaluka sub-districts of Mymensingh district in Bangladesh are selected as the study area. The study area selection is based on several criteria including the number of households, number of populations and the number of human resource for health. The number of household and the number of populations is taken from the demographic survey conducted by Bangladesh Bureau of Statistics (BBS) in 2011, and the number of human resource for health is taken from the live data of the directorate general of health services (DGHS), Bangladesh. According to 'District statistics 2011 Mymensingh' conducted by BBS, the top three sub-districts in terms of households and populations are Mymensingh, Bhaluka and Fulbaria as shown in the table 3-1. The number of household and the number of population of Phulpur and Tarakanda sub-district projected together since it was a single administrative area. Recently it has divided into two separate administrative areas, but the data is not separated yet. Therefore,

in terms of the number of household, Mymensingh, Bhaluka and Fulbaria are the top ranked sub-district in the Mymensingh district.

Table 3-1 Demographic and healthcare workforce statistics in grater Mymensingh District.

	Key Components of Well Functioning Healthcare System					
	Demographic Statistics		Human resource for Health			Service Delivery Network
Name of Sub-districts	Number of Household	Number of populations	Number of Physicians available	Number of Community healthcare providers available	Number of Midwives available	Number of health facilities available
Mymensingh	167472	776000	439	54	0	137
Bhaluka	106935	430000	17	33	0	67
Fulbaria	101189	448000	12	47	2	67
Gaffargaon	99093	431000	24	36	4	64
Trishal	93886	420000	16	40	2	58
Muktagacha	96657	415000	12	39	0	54
Nandail	87523	403000	14	32	2	51
Ishwarganj	81070	376000	18	41	1	55
Gauripur	72047	323000	14	26	2	46
Haluaghat	69725	290000	10	20	0	35
Dhobaura	44007	196000	10	18	Not found	29
Phulpur	135832	602000	21	54	1	90
Tarakanda				2		2

After the independence of Bangladesh in 1971, many of jobless peoples from across the country came to big cities for seeking jobs. According to slum census 2014 conducted by Bangladesh Bureau of Statistics, (2015, p. 3), “Many of these people were jobless, capital-less, homeless and had no other alternative other than to live in the slum areas”. These big cities where slum people increases day by day are including, Dhaka, Chittagong, Rajshahi, Khulna, Rangpur and Sylhet. According to slum census 2014, in terms of households and populations, Dhaka city is the top ranked slum area in Bangladesh shown in the table 3-2.

Table 3-2 Demographic statistics of major slum areas in Bangladesh.

Name of Slum Area	Demographic Statistics	
	Number of Household	Number of populations
Barishal	9629	49401
Chittagong	127585	635916
Dhaka	175931	1062284
Khulna	20658	172219
Rajshahi	10202	102036
Rangpur	6282	118628
Sylhet	11927	91630

Source: Census of slum areas and floating population 2014, Bangladesh Bureau of Statistics, 2015.

Another criterion is the key components of a well-functioning health system such as human resource for health (the number of physicians, number of community healthcare providers, and the number of midwives) and service delivery networks (the number of health facilities) (2010). With many other key components, human resource for health are the central key component to achieve and improve the health status of individual, families and communities. To achieve these goals, well managed healthcare service facilities are needed. Therefore, human resource for health and service delivery facilities are important for the development of well-functioning healthcare system.

Inadequate human resource for health and service facilities are common problems in developing countries. Bangladesh has no exceptions in this regard. Human resource for health and healthcare service facilities in selected study areas are not indicating the least number compared to other sub-districts of Mymensingh. But the number of human resource for health in rural areas are lower than the urban areas, and in slum areas are lower than the urban areas is well researched. Therefore, three sub-districts and urban slum areas are selected based on the number of households, populations and the number of populations getting healthcare services by per physician. After ranking and comparing, Mymensingh, Fulbaria and Bhaluka are the top ranked sub-districts in rural

areas and Dhaka is the top ranked area for slum residence that has potential to represent the current healthcare situation in rural and urban slum areas of Bangladesh.

3.2.3 Reason to Focus on 'Knowledge'

Knowledge has been recognized as a unique source and key elements of sustainable economic development and improvement of human well-being (Nonaka and Takeuchi, 1995; World Bank, 1998) over the last decade. However, in most of developing countries, the unequal distribution of healthcare knowledge, which leads to unequal economic growth and health well-being (World Health Organization, 2004). To improve the situation of poor healthcare knowledge distribution, its services system should be considered to understand significantly what knowledge, how and who are providing to customers in a pluralistic environment.

3.2.4 Knowledge vs Education

Education is one of the best way to transfer knowledge from one entity to another. Government and non-government organizations (NGOs) have taken several initiatives to transfer healthcare knowledge in Bangladesh. The transfer of healthcare knowledge through mass media, health campaigns, the use of community health educator, and routine counselling services at the healthcare service facilities. Many of such transfer process were improperly designed to reach the unserved and underserved peoples living in rural areas of Bangladesh. While the traditional way of healthcare knowledge transfer process was unable to aware rural residence, the SSs model for healthcare knowledge transfer succeeded. SSs are responsible for visiting households, holding group meeting with community peoples, provide skill training, basic literacy and basic healthcare services. In addition, SSs are holding meeting with community peoples targeting an issue relevant to community people's problem and issues, such as; violence against women, human rights,

family planning, water and sanitation, immunization, training on nutrition and basic curative services (Hadi, 2001). All of these support services can be seen as education on healthcare issues which aimed to raise awareness about health and healthcare among community peoples through knowledge transfer.

3.3 Shasthya Sebika Side

The study used snowball sampling, a method widely used in social science research (Biernacki and Waldorf, 1981), to collect data on the Shasthya Sebika side. Healthcare service providers living in rural areas in a limited resource context is hard to reach due to geographical transportation. In addition, it is difficult to communicate due to lower literacy level on language (Sadler et al., 2010). These challenges can prevent the access to information on healthcare services. Therefore, snowball sampling method is designed as data collection method that can overcome many of these challenges associated with healthcare information and data collection for the research purpose.

The term 'snowball sampling' is used in the earliest systematic research date back to 1940s (Handcock and Gile, 2011). Thereafter, the approach considered in sociological qualitative research for sample selection. An earliest definition of snowball sampling provided by Coleman (1958) cited in (Handcock and Gile, 2011) was "Snowball sampling: One method of interviewing a man's immediate social environment is to use the sociometric questions in the interview for sampling purpose". However, recently Noy (2008) also defined in his scholarly work and described the process how does it works. According to Noy (2008), "snowball sampling when the researcher accesses informants through contact information that is provided by other informants. This process is, by necessity, repetitive: informants refer the researcher to other informants, who are contacted by the researcher and then refer her or him to yet other informants, and so on. Hence the evolving 'snowball' effect, captured in a metaphor that touches on the central quality of this sampling procedure: its accumulative (diachronic and dynamic)

dimension".

In the present study, snowball sampling approach has been used as the study population was hard to reach, respondents language ability was not good enough to communicate, and also to reduce cost and time overall. In addition, the snowball sampling approach gives us the opportunity to grasp the real healthcare service phenomena and discover the factors associated to retain human resource for health and healthcare knowledge transfer in a limited resource context.

3.3.1 Sample and data collection procedure

The data collection procedure was started by contacting the BRAC HNPP head by e-mail and arranging interviews with various Shasthya Sebikas. After that we met with the program head at BRAC headquarters. In the meeting, the program head introduced to the HNPP District Program Manager for the Mymensingh district. In this way, Shasthya Sebikas in the rural areas of Bangladesh being introduced to us by their district manager and sub-district manager. This qualitative study was carried out in three sub-districts of the Mymensingh district: Mymensingh, Fulbaria, and Bhaluka as showing in the figure 3-1. Furthermore, three areas in each sub-district were targeted: Shambhuganj, Aqua, and Dapunia in the Mymensing sub-distrrict, Asim, Katlasen and Fulbaria in the Fulbaria sub-district, and Seedstore, Mamarishpur and Bhaluka in the Bhaluka sub-district.

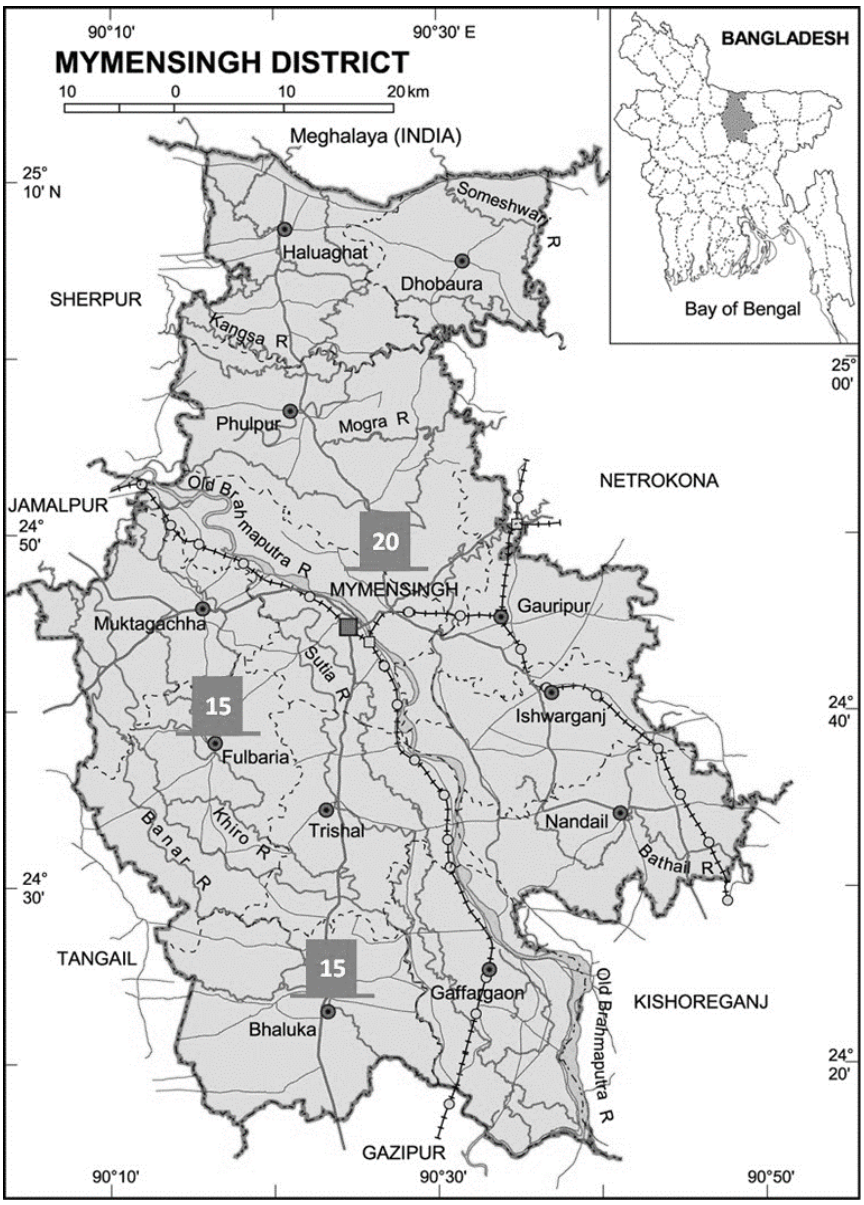

Figure 3-1 Study areas (Shasthya Sebika side).

All interviews were conducted in the Bangla language and recorded using an IC recorder. Prior to the interviews, the interviewees were assured that all information collected would be kept confidential, and written consent was obtained from each interviewee. The interviewers ensured that all informants understood the purpose of the research and questions asked. The interviews were conducted with each Shasthya Sebika individually in a rural setting.

3.3.2 Measurement

The interviews were conducted using a semi-structured questionnaire. The first five questions focused on the background of the interviewees and provided information about the interviewee's potential as a healthcare provider and perception of their activities.

The next five questions focused on the healthcare service delivery process and provided information about healthcare delivery in a limited access condition. The objective was to identify how effective innovations facilitate access to the healthcare services in a limited accessibility conditions. The questions were about the interviewee's daily work, the types and duration of training that they received from the HNPP, and types of healthcare services that Shasthya Sebikas were providing to rural inhabitants for promoting continuous health and well-being.

The last five questions focused on the interviewee's income, involvement with micro-finance, and present hopes and future desires. They also permitted a self-evaluation regarding the interviewee's contribution to the changes in the health of the people in their community. The interview questionnaires were developed, and the interviews were conducted in Bangla language and translated into English during transcription.

Table 3-3 Part 3: Contents of healthcare service delivery in the limited resource context

7	**Motivation for choosing the Shasthya Sebika profession**
a	**What is the main reason for choosing the Shasthya Sebika profession?**
b	**Monthly income from Shasthya Sebika profession (Unit of currency: Bangladeshi Taka=BDT)** ☐ < 1000 BDT ☐ 1001-2000 BDT ☐ 2001-2500 BDT ☐ 2501-3000 BDT ☐ 3001-3500 BDT ☐ > 3501 BDT
c	**Have you any other income except "Shasthya Sebika" provision? If have, how much per month (approximately)?** ☐ < 1000 BDT ☐ 1001-2000 BDT ☐ 2001-2500 BDT ☐ 2501-3000 BDT ☐ 3001-3500 BDT ☐ > 3501 BDT

Table 3-3 Continued

7	**Motivation for choosing the Shasthya Sebika profession**

d Supports getting from BRAC HNPP?

- ☐ Educational support
- ☐ Financial support
- ☐ Educational support for kids
- ☐ Healthcare support for me and for my family

e How much profit you get from healthcare product in a month?

☐ < 500 BDT	☐ 501-1000 BDT
☐ 1001-1500 BDT	☐ 1501-2000 BDT
☐ 2001-2500 BDT	☐ > 2501 BDT

3.3.3 Data analysis

Two kinds of analysis process have been done for this study. First, once the interviews were completed, the first author (a native Bangladeshi) listened to the audio tapes and translated the responses into English. The English transcripts were then entered an Excel spreadsheet, and the responses to each question were categorized as basic information about interviewee, work details, work motivation and output. A series of discussion about coding were held with the main supervisor in lab meetings. In total, three kinds of coding (Corbin and Strauss, 1990) were carried out using MAXQDA software. Open coding included an initial pass through the data to come up with candidate concepts for categories. After an initial level of analysis, categories were combined into major categories (axial coding). Finally, the focus shifted to core categories (selective coding).

Second, analyzed the data by means of co-occurrence network analysis. A co-occurrence network is a graphical visualization that shows the potential relationship between people, organization, concepts, and other entities existing in a written text. (Erhardt et al., 2006) define co-occurrence as "an event or situation that happens at the same time as, or relating to, another. In the context of text analysis, two entities are said to co-occur if they appear together in the same piece of text, such as a sentence or a paragraph". For example, buying a pen and a notebook at a bookstore is an example of co-occurrence, where the data is the pen and the notebook, and the purchase of these units is the particular transaction. Therefore, the paired data is {pen, notebook} and it happens once. If more items are purchased at a time, then the pairing becomes more numerous and each item will be paired with the other items. Therefore, co-occurrence networks are a collective interconnection of terms based on their paired presence within a specified unit or text and can be created for any text, which is beneficial for understanding the common mind-set of Shasthya Sebikas' working under the HNPP system and the common recognition of Shasthya Karmis' using technology for healthcare service delivery. We used KH coder software for the co-occurrence network analysis.

3.4 Shasthya Karmi Side

3.4.1 Data collection and sample characterization

The main objective of the interviews was to investigate the key factors that affecting healthcare knowledge transfer and improving well-being of slum dwellers in a limited resource context. Data were collected using semi-structured interviews with Shasthya Karmi. All interviewees were female because only women are recruited to serve as Shasthya Karmi in the BRAC health care program. First of all, the program coordinator for the BRAC Health, Nutrition and Population Program in the Dhaka district introduced

the program managers and Shasthya Karmis. Interviews were conducted with 24 Shasthya Karmis from four different areas: five in Korail slum, six in Badda slum, six in Sabujbag slum, and seven in Mohammadpur slum. The areas in which we have conducted interviews are shown in the figure 3-3. We ensured that all interviewees understood the purpose of the research and the reason for asking them questions.

Figure 3-2 Shasthya Karmis' are attending in a meeting with regional manager at office.

The authors started by ensuring that all the interviewees understood the purpose of the research and the reason for asking them questions. The interviews were conducted individually with each Shasthya Karmi's. All the interviews were conducted by the first author in Bangla language and recorded using an IC recorder. The BRAC Health, Nutrition and Population Program approved this research, including the use of these semi-

structure interviews. Prior to the interviews, the interviewees were assured that all information collected would be kept confidential, and written consent was obtained from each interviewee.

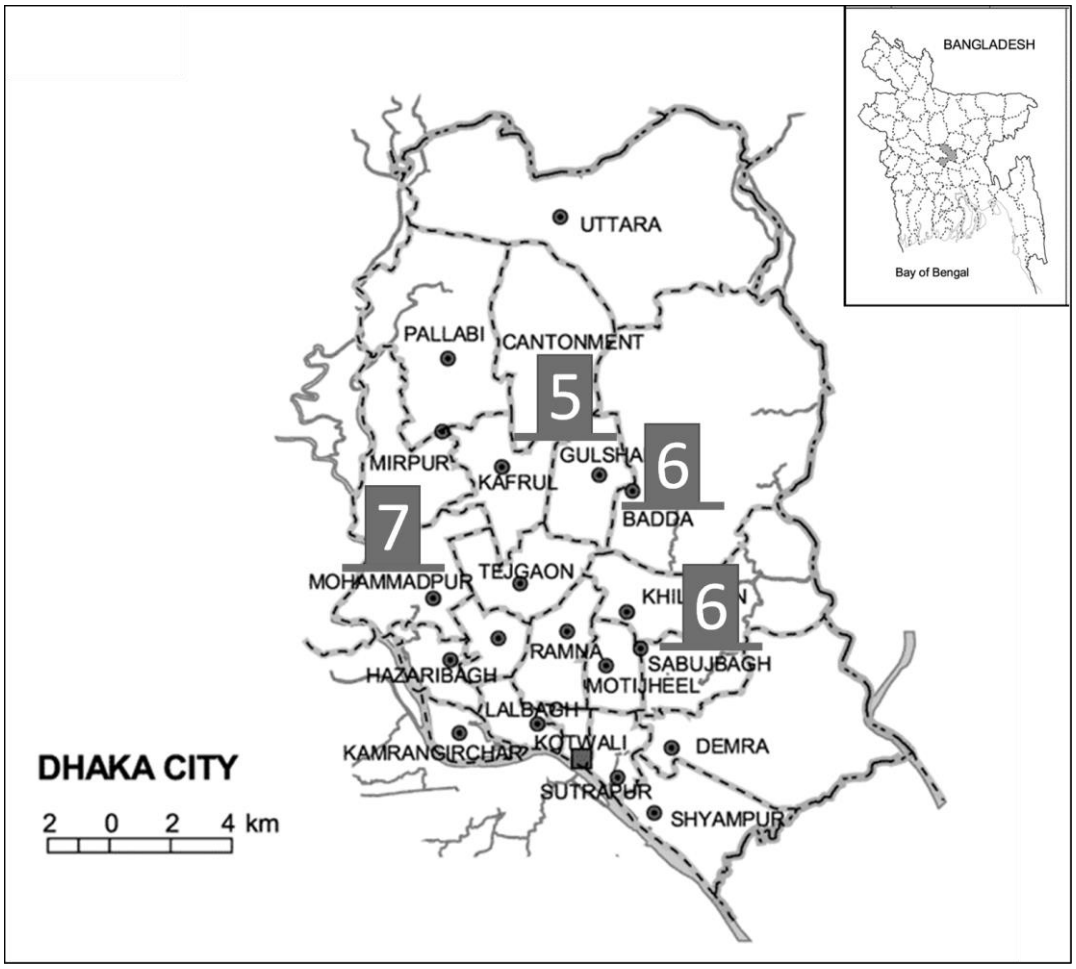

Figure 3-3 Study areas (Shasthya Karmi's side).

3.4.2 Measurement

The interviews were conducted using a semi-structured questionnaire. The first five questions focused on the background of the interviewees and provided information

about the interviewee's potential as a healthcare provider and perception of their activities. The next five questions focused on the healthcare service delivery process and provided information about healthcare delivery in a limited resource context in slum areas. The questions were about the interviewee's daily work, the types and duration of training that they received from the HNPP, and types of healthcare services that Shasthya Karmis' were providing to slum dwellers for promoting continuous health and well-being.

The last part of questionnaire was focused on the interviewee's income, involvement with micro-finance, and present hopes and future desires. They also permitted a self-evaluation regarding the interviewee's contribution to the changes in the health of the people in their community. The interview questionnaires were developed, and the interviews were conducted in Bangla language and translated into English during transcription.

Table 3-4 Work motivation and well-being outcomes

7	**Part 3: Work motivation and well-being outcomes**
a.	Types of works do with slum dwellers
b.	Mechanism that mHealth work for healthcare knowledge transfer
c.	Types of healthcare knowledge providing to slum dwellers
d.	How do you communicate with "Shasthya Sebikas'"?
e.	How do you respond to the patients' in slum areas when the need your support?
f.	Types of medical device uses during visits to slum dwellers
g.	Do you send any reminder SMS to patients before going to visit patients?
h.	Do you send SMS to pregnant mother time-to-time to make awareness, or encourage prenatal care?
i.	Do you get any useful information from patients that will be useful for other patients?
j.	Do you have any successful case who survived after getting your service?
k.	Do you feel any competition with other healthcare service providers during work?
l.	Do you feel any cultural/religious obstacles during your duty?
m.	Do you keep patients records during consultancy? If yes, how do you keep patient's records?

Table 3-4 Continued

7 Part 3: Work motivation and well-being outcomes

n. Do you face any difficulties when you provide healthcare information to the patients in slum areas?

□ Knowledge difficulties □ Social problem

□ Religious problems □ Others if any

o. Income except "Shasthya Karmi" provision? (approximately)

□ No Income □ 1001-2000 BDT

□ 2001-2500 BDT □ 2501-3000 BDT

□ 3001-3500 BDT □ > 3501 BDT

p. Supports getting from BRAC HNPP

□ Educational support
□ Financial support
□ Educational support for kids
□ Healthcare support for me and for my family

3.4.3 Data analysis

Data analysis procedure is same as the procedure employed for the study of Shasthya Sebika side.

Chapter 4 Factors Affecting to Retain Human Resource for Health in a Limited Resource Context

4.1 Introduction

Better healthcare service is a key element of changing people's lives (Sweeney et al., 2015). Therefore, a well-functioning healthcare service system is needed. Such a system requires a well-trained and adequately-paid workforce, well-maintained health facilities and technological support for delivering healthcare services at the point in time when the patient needs them. Attention to healthcare services is needed in all countries around the globe.

For the last few decades, healthcare organizations are facing several challenges. These are including lack of easy access to healthcare services, lack of hospital and clinics, raising high cost for healthcare, changes in service pattern from traditional to ICT based, and most importantly severe shortage of human resource in healthcare. Particularly, healthcare in developing countries are facing the critical shortage of healthcare workforce and resulting inadequate healthcare services among people living in rural and urban slum areas.

The World Health Organization estimated that 4 million more health workers were needed in 2012 to resolve the shortage and that most of the shortages were in developing countries, resulting in higher mortality rates for mothers and children (World Health Organization, 2006). Bangladesh is a developing country and classified as having a critical shortage of human resource for healthcare. The skilled human resource for healthcare in Bangladesh is only 5.27 per 10000 populations (WHO, 2016). It is quite

bellow the global average human resource for healthcare. The global average human resource for health is 25.0 per 10000 populations (WHO, 2016). This level of human resource for health in Bangladesh would endanger to achieve of health-related sustainable development goals (SDGs) 3, which was recently announced by the United Nations (United Nations, 2015), aims “to ensure healthy lives and promote well-being for all at all ages”. By the end of 2015, the neonatal mortality rate and maternal mortality rate was 23.3 per 1000 populations and 176 per 100000 live births (WHO, 2016). But, according to SDGs, Bangladesh need to reduce this rate to 12 per 1000 populations 70 per 100000 live births. Therefore, large efforts are required to address the human resource for health challenge to be achieved SDGs goal by the deadline 2030.

4.2 Objectives of the study

The aim of this study is to investigate how Bangladesh Rural Advancement Committee (BRAC) develops and efficiently utilizes healthcare human resources in its system in a limited resource context, namely, in rural areas of Bangladesh. First, we explain the structure of BRAC HNPP through secondary data. Next, we investigate through interviews how BRAC develops and efficiently utilizes healthcare human resources in its system. The findings in this work will help healthcare policy makers in developing countries to understand what policies and strategies could help to retain human resource for health in the limited resource context as well as how this kind of system could help in achieving SDGs by the year 2030.

4.3 The overview of BRAC and BRAC HNPP system

4.3.1 About BRAC

Bangladesh Rural Advancement Committee (BRAC) is the world largest nonprofit organization in terms of number of employees and the number of people it has helped as of September 2016 (www.brac.net). The BRAC has established in 1972 just after the country Bangladesh became independent and dedicated to alleviating poverty by empowering the poor. The BRAC philosophy is to unite both economic and social development by reducing sustainable poverty. BRAC therefore emphasis on microfinance activities as part of BRAC's broader and holistic approach to development by improving access to a range of social services including microfinance, agricultural, safe drinking water and sanitary latrines, livelihood training, support for safe migration, assistance during natural disaster, skill development, education, legal aid and healthcare. From its early development, BRAC is committed to reduce poverty through its microfinance or microcredit program as well as reduce health disparities through its healthcare programs under the umbrella of its microcredit and health program in different countries. The term microfinance is more used to as microcredit. We use the term microcredit instead of microfinance.

4.3.2 Microcredit service system in BRAC

Bangladesh has been a pioneer and model of microcredit services since its first implementation in the early 1980s. Today Bangladesh is well known as the home of microcredit in the world. Microcredit is involved with a small-scale loan transection in credit and savings aimed to meet the needs of poor households who intended to start a small or medium business. The microcredit experience in Bangladesh is practicing and

implementing in many other developing countries in the world. Due to the well recognition of microcredit, a leading microcredit institute named Grameen Bank (Village Bank) awarded for the noble peace prize in 2006 with its founder Muhammad Yunus.

Microcredit is a simple term which can be described as small loans offered to poor household to foster self-employment and income generation for the poor householders. BRAC provides microcredit loans through its Rural Development Program (RDP). The nucleus of RDP is the village organization (VO). The VO is formed by women from poor households having less than 50 decimals of land and used to sell physical labor in the village. The aim of providing small loans to VO members to reduce poverty by income generating activities. Another feature of the formation of VO is to link with rural women as well as strengthen the ability of poor women in terms of sustainable development. There are currently 220,000 VOs comprising around 6.37 million members in Bangladesh (Ahmed, 2008).

4.3.3 Healthcare service system in BRAC

Realizing the impact of microcredit service system on country's development, BRAC soon realizes that the health service system can have potential high impact in reducing vulnerability of poor households in rural areas. Therefore, BRAC initiated and essential health Care (EHC) services and intervene with the microcredit service for delivery healthcare services since 1991. The EHC service is the foundation health service of BRAC which combining basic preventive and curative services and providing to unreached and unserved peoples in rural areas of Bangladesh. The frontline health workers of BRAC healthcare services is the Shasthya Sebika who forms from the VO members and works as a bridge between the communities where they live and formal public health system. As a result, Shasthya Sebika can provide affordable healthcare services to those who are in health risk in the rural areas of Bangladesh.

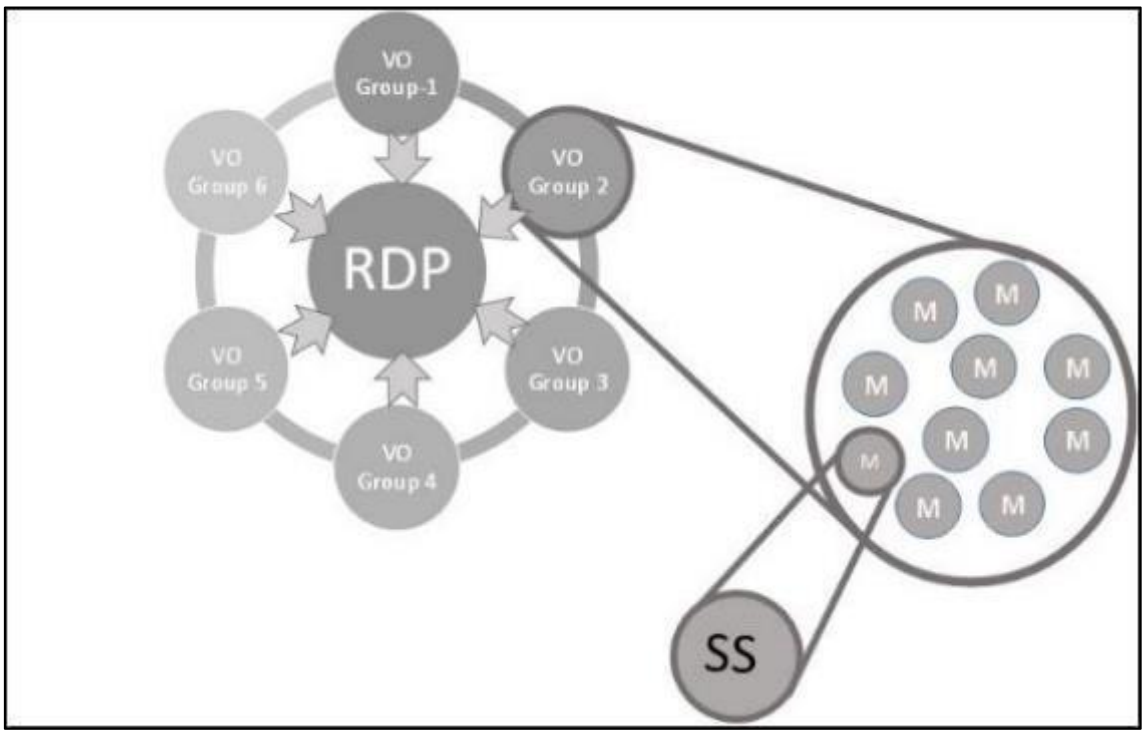

Figure 4-1 Shasthya Sebikas selection procedure in BRAC healthcare service system (Source: Authors' interview).

4.3.4 Shasthya Sebika in healthcare service

Repeatedly, the nucleus of RDP is VO. Each VO consists of 30-40 women from respected community. The VO members hold internal discussion among themselves and nominate a person called Shasthya Sebika as a healthcare service deliverer (Ahmed, 2008). The VO system is a platform for supplying human resource for healthcare services in rural disadvantaged communities.

Figure 4-2 Shasthy Sebika (left), medicines and health commodities inside the Shasthya Sebikas' carrier bag (right), (source: Authors' interview).

Figure 4-3 Shasthya Sebikas' are in refreshers training at regional office (source: Authors' interview).

Shasthya Sebika is a Bengali term that refers to the volunteer health worker who is responsible for providing healthcare services in her own community. The Shasthya Sebika receives a 3-week training on maternal, neonatal, and child health, immunization, family planning, and a few common diseases such as the common cold, fever, cough, diarrhea, anemia, warm infection, and scabies (Khan et al., 1998). The Shasthya Sebika visits households in her own community in rural areas and provides healthcare knowledge and primary treatments. She can also provide medicine as needed. When the Shasthya Sebika faces a case that is beyond her capability, she refers the patient to the nearest government or private hospital including BRAC health centers where available.

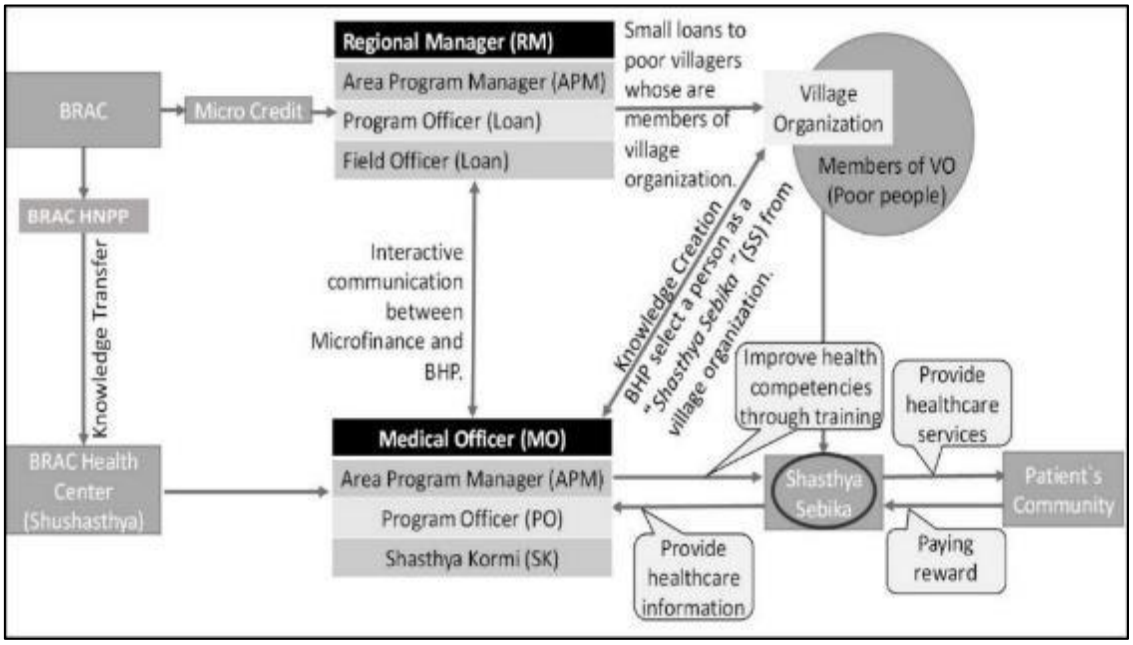

Figure 4-4 Shasthya Sebika in BRAC healthcare service system (source: Authors' interview).

4.4 Findings

4.4.1 Demographic findings

The demographic result shown in the table 4-1 that the mean age of Shsthya Sebika is 35 years old while the youngest is 22 and the oldest is 55 years old. The national statistics of female labour force reported that, 51.5% of the total female labour force in 2011 were 15-29, 45.5% were 30-64 and 3% were 65+ years old (*Labour Force Survey (LFS) Bangladesh 2013*, 2015).

Table 4-1 Demographic analysis of Shasthya Sebikas.

Indicators	Shasthya Sebika	Bangladesh situation
Mean age	35, the youngest was 22, and the oldest was 55	51.5% of the total female labour force in 2011 were 15-29 years old, 45.5% were 30-64 years old, and 3% were 65+ years old.
Education	The majority of the SSs had 5-10 years of schooling, while around 51% had 1-5 years of schooling experience.	29.1% and 8.6% of working women had completed secondary school education and higher secondary education, respectively.

The education background of Shasthya Sebika indicates that the majority of Shasthya Sebikas have completed 5-10 years of schooling education. It is significantly indicated that 51.5% of Shasthya Sebika's have 1-5 years of schooling experience. Mentioned that, up to 5 years of schooling education experience is equivalent to primary education and 10 years of schooling education experience is equivalent to secondary education in Bangladesh. The education level of working women in Bangladesh is moderate. (*Labour Force Survey (LFS) Bangladesh 2013*, 2015) reported that, 29.1% and 8.6% of total working women have completed secondary and higher secondary education.

4.4.2 Findings from coding analysis

The impact BRAC's micro-credit system on poverty is significant (Chowdhury et al., 2005). The micro-credit in general is small loans offered to poor households to improve human capability including job opportunity and income generations. Micro-credit is widely using in developing countries as a tool for alleviating poverty (Cons and Paprocki, 2008). Unlike in traditional banking systems, where borrowers must provide collateral against the loan, in the BRAC micro-credit system, they do not. BRAC offers small loans to poor households, focusing especially on women as they tend to be reliable savers and borrowers.

BRAC forms "village organization (VO)" to link it with rural women. The aim of this organizational structure is to strengthen the capacity of poor women for sustainable

development. There are 220,000 village organizations with around 6.37 million members. Each organization comprise 6–8 groups, and each group comprise 30–40 women. BRAC defines the poor as people owning half an acre of land or less. One woman acts as the group leader and works to develop discipline, assign responsibilities, and ensure accountability. The members, along with a BRAC program organizer, meet weekly to identify problems and opportunities, to collect and provide small loans, to make interest payments on loans, and collect obligatory savings. They also meet once a month meeting to discuss social and health issues, provide health-related knowledge, discuss rights and legal issues, and address member problems. The village organizations are a platform for building skills and providing resources such as those for a teacher providing pre-primary or elderly education and those for health workers working in rural disadvantaged communities.

The study analysis revealed that the micro-credit system is the key factor that BRAC uses to develop and utilize health workers. In a micro-credit system, very small loans are extended to disadvantaged borrowers who do not have collateral and/or secure employment. Shasthya Sebikas are one of them. They are also getting small loans from micro-credit system for income generating activities. By using this small loan, Shasthya Sebika purchase essential medicines and health commodities and sell them to clients in their community and making profit. They enjoy a part of profit for their daily life improvement and repay the loan in the basis of weekly installment of micro-credit system. There are also other extrinsic and intrinsic motivations such as incentives from midwifery services, incentives from patients' identification, access to healthcare services for their family members, and social recognition that encourages VO members to become Shasthya Sebika.

Table 4-2 Factors affecting to retain human resource for healthcare in BRAC HNPP.

	Factors	Number of Shasthya Sebika (N=51)
Extrinsic Motivations	For incentives	33%
	For Social recognition	5%
Intrinsic Motivations	Desire to help community peoples	22%
	Improving health of the community	9%
	Desired to help own community	3%
	Desire to transfer healthcare knowledge among community peoples	3%
	For own safety	3%
No Specific Motivation		14%

The study analysis also revealed that several factors shown in the table 4-2 motivated the Shasthya Sebika to join the BRAC HNPP as health workers. Most were motivated by the need to earn money in a country with a high level of unemployment so that they could improve their family's situation, particularly regarding their children's education. This factor is evidenced by comments such as the following.

"I am a housewife in a poor family. I was unable to support my family in the worst situations, even when my kids were leaving for school due to financial inability. Therefore, I decided to become an independent community health worker. Day by day I was able to reduce poverty in my family, better able to support my kids' education, and save some money for the future." (*Shasthya Sebika* no. 50; Age: 55; Area: Talabor, Katlasen, Fulbaria)

"I don't have enough education to do other jobs. (Snip) Therefore, I became a community health worker. My husband is a daily labourer, and his earnings are not sufficient to cover family expenditures. Once, when he became sick and could not earn any money, our family fell into a financial crisis. Therefore, I decided to get a job and help support my family. (Snip) Now I am doing well and supporting my family with the money I make as a community health worker." (*Shasthya Sebika* no. 24; Age: 32; Area: Chor Borbila, Bhaluka)

Another factor is social recognition:

"Now I am working and generating income, unlike three years ago. In addition, I've

attained social recognition, which is important for me. I was unknown to others in the community when I was only a housewife. But now, all the peoples in my community know me as a community health worker and as a community doctor. So, most people in my community ask my opinion before deciding important things." (*Shasthya Sebika* no. 27; Age: 28; Area: Gopalnogor, Bhaluka)

In addition to these extrinsic motivations, several people interviewed mentioned an intrinsic motivation for becoming a community health worker including a desire to help others in the community, help her own family, and transfer health knowledge among community members.

"I decided to become a community health worker because I wanted to help people in my community by providing health knowledge. In addition, I have a better opportunity to earn money." (Shasthya Sebika nos. 13, 31; Ages: 24, 30; Area: Boidhyobari, Seedstore, Bhaluka*.)*

VO members were motivated by both the intrinsic and extrinsic motivation to become Shasthya Sebika and transfer healthcare knowledge to rural communities. The intrinsic motivation can extend Shasthya Sebikas' capacities to explore and learn about healthcare knowledge. Therefore, Shasthya Sebikas' are not necessarily motivated to work by getting monetary incentive, but the honor to the society.

Women in Muslim communities does not allow to go far from house alone. However, when income is important for the betterment of the family, they choose a profession which they can commute from their own house. One of the health workers expressed her opinion as follows.

"I was a housewife before joining as community health worker. Because, my husband didn't allow me to do job far from my house. But, when I told my husband about the issue of providing healthcare services to my own community people as a community health worker, my husband encouraged and allowed me to work." (*Shasthya Sebika* no. 32; Age: 25, Area: Akua Dorgapara, Mymensingh).

These findings show that the main motivation was extrinsic—the opportunity to earn money. The system of community health workers under the micro-credit system made it possible for women who wanted to earn money to work from home and also within their community, thereby supplying motivated human resources in limited resources areas.

Table 4-3 Types of motivation and corresponding comments from *Shasthya Sebika* interviews.

Types of motivations		Corresponding comments
Extrinsic motivation	Monetary and social recognition	If I do work as a shasthya sebika, I can earn money. Moreover, community people will have benefited by getting health services from me. Moreover, my personal image will increase in society. [shasthya sebika no. 1]
		I chose this profession only to provide healthcare. [no. 3]
		I was jobless, so I asked a shasthya karmi for work. I was a member of a BRAC Village Organization, and a few days later, a shasthya karmi asked me to take training as a shasthya sebika in BRAC. [no. 4]
		I can provide treatment to community people and earn money. [no. 10]
		I had no income in my family. Therefore, I decided to work with BRAC as a shasthya sebika. Now, I have income from my profession. My present income is enough to cover my children's educational expenses. Now I am well known as a physician in my community. My income and honour are both increased. [no. 11]
		I was poor at that time. So, an income source was needed to support my family. Therefore, I decided to work as a shasthya sebika. [no. 14]
		I choose the shasthya sebika profession to keep me safe. For example, if there are many patients in my community, it affects me also. [nos. 17, 18]
		To help people in society. Now I feel that the shasthya sebika profession is win-win. [no. 19]
		I was a teacher at a BRAC School. Suddenly I lost my job and became unemployed. Right at that time I got an offer from a shasthya karmi madam to become a shasthya sebika and I accepted. [no. 22]
		I don't have enough qualifications to do another job. Therefore, I became a shasthya sebika. My husband was a labourer and his income was good. But he became ill, and his income stopped. My family fell into a financial crisis. Therefore, I decided to take a job to support for my family. I met with a shasthya karmi madam, and she asked me to work as a shasthya sebika. I accepted and received training. Then I became a shasthya sebika. Now I am doing well and supporting my family with my earnings as a shasthya sebika. It was a terrible situation for my family that I overcame by becoming a shasthya sebika. [no. 24]

Table 4-3 Continued

Types of motivations	Corresponding comments
	For both benefit. At me side, I have a certain income that was not exactly three years ago. Social recognition is also important for me. I was unknown to people in the community when I was only a housewife. But now, all of the people in my community know me as a community health volunteer and as a community doctor. Now most people in my community ask me my opinion before making decisions about important things. [no. 27]
	I had no other work but housewife. My husband's income was not so good. Therefore, I decided to work as a shasthya sebika to generate income. [no. 28]
	I was a housewife. I had no idea about healthcare services. Whenever a shasthya sebika or shasthya karmi come to our house to make us aware of healthcare, my mother-in-low was annoyed them. But now, as a shasthya sebika, I know about healthcare and share my healthcare knowledge with people in my community. [no. 29]
	I was leader of a co-operative association. At that time, I was looking for work to generate income, I got an offer from a shasthya karmi to become a shasthya sebika. I took that offer and joined as a shasthya sebika. [no. 34]
	I was simply a housewife. I had no work and no income. I decided to become a shasthya sebika. I'm now enjoying my job very much. I was always very curious about new things. Therefore, I came to shasthya sebika and providing healthcare services to my community people. [no. 37]
	I was a housewife. I had no work. I thought that, if I have job and income source, it would be more helpful for my children and family. [no. 40]
	I was a housewife and did not have a job. So, to have some easy work, I decided to join as a shasthya sebika. I got training from BRAC HNPP and started my work. [no. 41]
	I was a housewife. I became a shasthya sebika in order to increase my income. In addition, I thought that, if I work as a shasthya sebika and provide healthcare information to people in the community, they will get my help, and health problems will be reduced. [no. 42]

Table 4-3 Continued

Types of motivations		Corresponding comments
		I was a housewife with no work except for my own household work. I thought that if I had an income source I could contribute to my family. I found that, if I worked as a shasthya sebika, I could contribute to society by helping people keep healthy. [no. 43]
		I was a housewife. I was curious to find income generating work that would solve our financial problem. Therefore, I decided to work as a shasthya sebika in my community because this job is very easy to do after finishing my own household work. [no. 45]
		I was housewife. Having no work. I was interested in earning money to support my family. At that time, I knew about shasthya sebika and decided to join. [no. 49]
		I was housewife, and my family is poor. I needed to earn money to support my family. Therefore, I decided to become a shasthya sebika. [no. 50]
Knowledge improvement		To learn and teach others. [no. 12]
		Because of my own learning as well as to teach others in my community. Another reason is to improve health awareness of the people in my community. [no. 15]
Intrinsic motivation	Motivation	To help people in my community improve their health condition. [nos. 5, 7, 9]
		I enjoy this work. I can motivate people in my comm`unity to use healthcare services. More importantly, they are benefitted by me. [no. 8]
		Most people in my community are not concerned about their health. I thought that, if I can provide health information to people in my community as a shasthya sebika, they will have benefitted from me. Therefore, I decided to work as a shasthya sebika. [no. 13]
		Because I want to serve the people in my community. [no. 31]
		I was a housewife before becoming a shasthya sebika. My husband didn't want me to do anything outside our house. But, when I was recruited to become a shasthya sebika to provide healthcare service to people in our community, he encouraged me to join. [no. 32]
		Because I can help people in my community. I learned from my experience during the birth of my eldest son. During that time, I felt difficulties, and later on I decided to become a shasthya sebika so that other prospective mothers could be aware of risks during their pregnancy. [no. 33]

Table 4-3 Continued

Types of motivations	Corresponding comments
	I was a housewife. I thought about how I could help people in my community? I took training as a birth attendant. Later, I joined BRAC HNPP as a shasthya sebika and worked in my community serving the people. [no. 44]
	I was housewife. I like to walk from house to house. I also like to talk with people. Through my work, I can help society, so I decided to become a shasthya sebika. [no. 46]
	I was housewife. To learn new things and share my learning with people in my community, I decided to work as a shasthya sebika. [no. 51]
No Specific Motivations	Without knowing anything, suddenly I became a shasthya sebika. I was a member of a BRAC Village Organization, and they asked me to become a shasthya sebika in my community. [no. 2]
	I didn't know anything about healthcare before becoming a shasthya sebika. When a shasthya karmi madam asked me to work as a shasthya sebika, I accepted. There was no particular reason actually. [no. 16]
	I was very curious about everything. Because of my curiosity, a shasthya karmi madam asked me to become a shasthya sebika. I accepted and became a shasthya sebika. [no. 21]
	My family didn't permit me to take any job other than becoming a shasthya sebika. [no. 23]
	I was a member of BRAC human Right. Then I came here to work as a shasthya sebika. [no. 25]
	I was a housewife and had no other work. [no. 30]
	I was a housewife. I haven't encountered any difficulties from society when working as a shasthya sebika. [no. 35]
	I was housewife. I didn't know anything about basic diseases, so my family sufferered several health problems. Since I received training as a shasthya sebika, we have been fine. [no. 38]
	I was an adult education teacher focusing on Muslim Family Law for rural women. Later on I became a shasthya sebika and now work in my community. [no. 39]
	I was housewife. I am curious to learn new things. Therefore, I decided to work as a shasthya sebika in my community. [no. 47]
	I was housewife. The shasthya karmi in my community saw that I was an effective and good worker as a member of the BRAC microfinance organization. Therefore, she asked me to become a shasthya sebika, and I accepted the opportunity. [no. 48]
	N/A [nos. 6, 20, 26, 36]

4.5 Findings from co-occurrence analysis

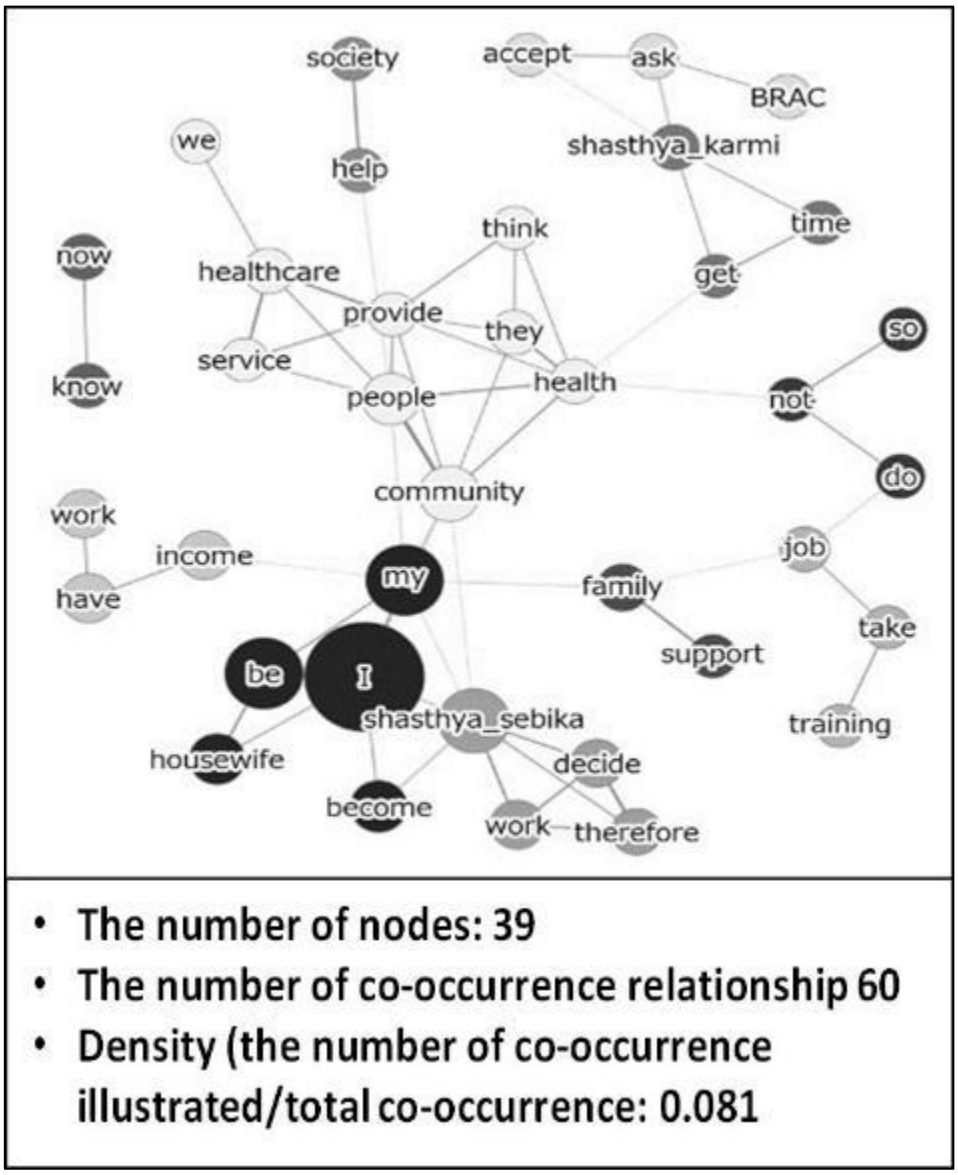

Figure 4-5 Result of co-occurrence network analysis from *Shasthya Sebika* interviews.

The various motivations of healthcare workers, as based on responses to the

question about why they became an Shasthya Sebika, are shown in figure 4-5. The core of the biggest cluster, which consists of “I”, “be”, “Shasthya Sebika”, etc., shows these motivations. Looking at the branches from the core, we can see several concrete reasons with dot lines such as “work”, “income”, “support”, and “family.” This indicates that one of the reasons is to earn money to help support their family. There is also a branch connecting “people”, “community”, “help”, and “society.” This implies that social value acquired by providing healthcare service is another motivator. Apart from this, there is a cluster of “take” and “training”, implying that the opportunity to improve their abilities is another motivator. Some of the respondents had no specific reasons to become Shasthya Sebika but just accepted the offer from the BRAC HNPP Shasthya Karmi.

Table 4-4 Descriptive statistics of *Shasthya Sebika* interview result.

Noun	#	Proper noun	#	Personal pronoun	#	Adv	#	Verb	#
community	29	shasthya_sebika	47	I	136	therefore	11	be	61
people	22	shasthya_karmi	9	my	60	now	9	become	22
housewife	20	BRAC	7	they	8	not	5	have	17
income	16			we	6	so	5	work	16
work	15							decide	14
family	13							ask	8
healthcare	10							do	7
health	8							know	7
job	8							help	6
service	5							provide	6
society	5							accept	5
time	5							get	5
training	5							join	5
								support	5
								take	5
								think	5

These findings highlight the variety of motivators to work as an Shasthya Sebika, including the extrinsic—the opportunity to earn money—and the intrinsic—the opportunity to contribute to the well-being of society. The system of community health workers under the micro-credit system makes it possible for such motivations to be supported, thereby ensuring a steady supply of motivated human resources in areas with limited resources.

Chapter 5 Factors Affecting to Transfer Healthcare Knowledge and Improving Well-being in a Limited Resource Context

5.1 Introduction

With the rapid changes of technological innovation since the late 20s centuries, there has been tremendous improvement of healthcare service delivery systems especially in developed economic zones. Technology giving the opportunities to well-function the healthcare delivery service system in order to improve human quality of life. Because, better healthcare service is the key element of human happiness and quality of life (QOL). Its impact on patients' QOL determines the superior impact on changing people's lives (Sweeney et al., 2015). Therefore, to sustain and improvement of healthcare service delivery system, it requires a well-trained and adequately-paid workforce, well-maintained health facilities and as well as technological support to deliver healthcare services at the point of time. There is a need to consider on healthcare services in all of the countries around the globe.

Healthcare in developing countries are facing many challenges, including critical shortage of healthcare workforce, insufficient healthcare infrastructure, and low income per capita. The World Health Organization (WHO) estimated that, 12.9 million healthcare workers will be needed in 2035 to resolve the healthcare workforce shortage all over the world, which is especially evident in developing countries (Jim et al., 2013). The problem particularly affects primary care for rural and slum dwellers more so than for urban

citizens.

The sustainable development goal (SDG) 3 has recently been announced by United Nations (Buse and Hawkes, 2015), which aims "to ensure healthy lives and promote well-being for all at all ages". These goals would be difficult to achieve due to the shortage of healthcare workforce. Therefore, developing world need to redesign healthcare services in order to address these challenges.

Developing countries need to consider an innovative solution to address the healthcare workforce challenge. A Bangladeshi indigenous non-governmental organization (NGO) Bangladesh rural advancement committee (BRAC) has tried to improve healthcare workforce by using community female through BRAC healthcare, nutrition and population program (HNPP). The BRAC HNPP has been providing healthcare services privately with the collaboration of government and international agencies since 1972 to vulnerable peoples in rural and urban slum areas through Shasthya Karmis' with the help of local Shasthya Sebikas. The Shasthya Karmi is a female healthcare worker and the Shasthya Sebika is a female voluntary based healthcare worker. The Shasthya Karmis' are transferring healthcare knowledge as frontline employees of BRAC HNPP to rural and urban slum communities through face-to-face communication. Through the process, the Shasthya Sebilkas' collect household information and build patients' database by using mobile phone (called mobile health: mHealth) in especially urban slum areas. This knowledge transfer between organization and end users' (patients') community is a unique process under the limited resources in developing country.

The present study will focus on mobile phone technology interventions for HKT among slum dwellers who are in health risk, unreached and unserved. Mobile phone technology diffusion has happened across the world much more rapidly than any other technology diffusion. The world mobile cellular subscriptions have reached 96.3 per 100 people in 2014 (The World Bank, 2015). In developing countries, the percentage of individuals used mobile phones is 76.0 percent which indicates the rapid grown of mobile subscribers in Bangladesh (The World Bank, 2015). Many developing countries have taken mHealth initiatives to promote and access healthcare services (Ivatury et al., 2009; World Health Organization, 2011a). Several studies have been conducted regarding mHealth in developing countries.

While there have been limited studies of the impact of mHealth in health system,

none have investigated the impact of mHealth in improving access to quality healthcare services and health well-being through healthcare knowledge transfer.

Therefore, all these factors have motivated authors to investigate the mHealth impact on healthcare knowledge transfer (HKT) in slum areas in Bangladesh. This study will fill up the gap by investigating the impact of mHealth in improving access to quality healthcare services and health well-being in Bangladesh.

5.2 Objectives of the study

The objective of this study is to investigate how does the mobile phone technology facilitates healthcare knowledge transfer in a limited resource context, namely, in urban slum areas of Bangladesh. In this study, we investigate through interviews how does BRAC supports to Shasthya Karmi's in mhealth services. Finally, the study will identify barriers of using mobile phone to transfer healthcare knowledge in slum areas of Bangladesh. The findings in this work will help healthcare policy makers in developing countries to understand what policies and strategies could help to implement mHealth services and healthcare knowledge transfers through mobile phone technology in a limited resource context. To attain the objectives, we came up with a theoretical framework of mHealth services and its application in the slum dwellers. As the study area is broad in nature, and healthcare knowledge have no limited boundary, the present study aims to investigate two areas e.g., maternal and child health care knowledge transfer and its outcomes among slum dwellers.

5.3 Findings

5.3.1 Demographic findings

The demographic distribution of Shasthya Karmi summarized in the table 5-1. It is noted that for the present study all the respondents were female. In the BRAC health care program, only females are recruited to serve in the slum areas as Shasthya Karmi. The mean age of Shasthya Karmis' was around 27 years old. The youngest was 18, while the oldest was 39 years old.

Table 5-1 Demographic analysis of Shasthya Karmis'.

Gender	Age (years)	Education	Years of experience	Visit households
Female 24 (100%)	Mean: 26.83	Bachelors (study on going): 16.67%	Mean: 2.54	Mean: 5.59
	SD: 5.42	Higher Secondary: 29.17%	SD: 2.77	SD: 7.10
	Min: 18	Secondary: 54.16%	Min: 1	Min: 25
	Max: 39	Others: 0	Max: 9	Max: 50
	N = 24			

Regarding educational background, the majority of the Shasthya Karmis' had secondary school education, while around 30% had higher secondary education, and 17% Shasthya Karmis' are continuing their Bachelors education during their job. The number of years that Shasthya Karmis' has working in the BRAC healthcare service ranged from 1 to 9 years. The mean years of working experience was 2.54.

Regarding the number of visit to households, the table shows that the number of household visits by Shasthya Karmi's was ranged from 25 to 30 households per day. The mean number of household visit was 5.59.

5.3.2 Main findings from coding analysis

Several respondents gave more than one answer, which were coded accordingly. These answers were coded into separate categories. The numbers within brackets indicate the total number of responses against particular category.

The first objective of this study was to identify how does mHealth facilitate healthcare knowledge transfer in slum areas of Bangladesh. To address this objective, we have categorized the findings into two categories. The first category was the types of knowledge which transferred by Shasthya Karmis' to slum dwellers' in a limited resource context. The second category was the way the shsthya karmi transferred healthcare knowledge to slum dwellers in a limited resource context. It was apparent that most of the Shasthya Karmi's work with new-born babies, children between 0-5 years old and maternal health services, identify tuberculosis patients and provide them treatment to reduce tuberculosis burden.

Focusing on the types of healthcare knowledge which transferred by Shasthya Karmis' are providing healthcare knowledge about maternal, neonatal and child health knowledge (32), knowledge about tuberculosis disease, control and cure (20) and healthcare knowledge on ten basic diseases (18). Maternal, neonatal and child health knowledge including routine check-up, risk signs, whether needed to take vitamins and minerals supplement based on nutritional deficiencies during pregnancy. Neonatal and child health knowledge including care before and after child born, nutritional care in between 0-5 years old, and vaccinations. In addition, Shasthya Karmis' are also provide knowledge on family planning and sanitation improvement of slum dwellers in a limited resource context. Apart from these knowledge transfer, Shasthya Karmis' are also provide knowledge on tuberculosis treatment to control and cure. Similarly, shsthya karmis' are providing basic healthcare knowledge on basic ten diseases.

In two ways the Shasthya Karmis' consider transferring healthcare knowledge to slum dwellers. One is directly through daily home visit and the other way is through mobile phone (70). A Shasthya Karmi go to Shasthya Sebika's house and sign on the register. After that, Shasthya Karmi is responsible to visit households along with Shasthya Sebika, collect household information and put this information into the mobile, and

provide healthcare solutions against health problems that shsthya sebikas' were faced during their knowledge transfer provision. In addition, shsthya karmis' are responsible to monitor and evaluate shsthya sebika's activities and help them to solve problems encountered while delivering services.

One of shsthya karmi mentioned that 'we are using mobile phone to collect household information including name, age, profession, level of income of household members, and location where they live. We also take a picture of every household member by using camera installed into the mobile phone. After ended the input process, we just push send button in a mobile phone and all information goes to main server. Therefore, a strong information database about slum dwellers can be developed which will certainly help to provide better healthcare solution'.

The other way to transfer healthcare knowledge through mobile phone during household visits and also from remote (33). The study identified two unique ways in which the Shasthya Karmi's used mHealth to transfer healthcare knowledge. The first way was acquisition and providing healthcare information (26), and the second way was to keep patients records in the mobile-based computer system (5). In addition to providing support during home visits, the Shasthya Karmis provide support through their mobile phone. Slum dwellers can contact Shasthya Karmis' if they face difficulties with their health. Such support was made possible by the implementation of BRAC mHealth, a service used to keep client records and to build a comprehensive healthcare database, thereby providing point of healthcare services to community residents. The Shasthya Karmis are responsible for implementing mobile healthcare services in slum areas.

Shasthya Karmi show a video on their mobile phone to pregnant women which explains the 'risk signs during pregnancy'. Pregnant women noticed and aware about the risks and complexities during pregnancy through the mobile video. Therefore, pregnant women could take necessary action, suggestions from shsthya karmis' to avoid these risks and complexities. Pregnant women can take necessary suggestions and solutions through mobile phone while Shasthya Karmis' are at home or at office. Apart from healthcare knowledge transfer through mobile phone, Shasthya Karmi also communicate with BRAC HNPP staffs especially with shsthya sebika prior to visit her. Patients or slum dwellers also can contact Shasthya Karmi through mobile phone at any time when they needed.

One of respondent mentioned ‘I have stored shsthya sebikas’ mobile phone numbers into my mobile phone. Therefore, I can contact shsthya sebika at any time when it is necessary. In addition, I contact at prior to visit households with respective Shasthya Sebika.’

Another respondent expresses her opinion as ‘we provided three mobile phone numbers to all slum dwellers. They could reach to us through using any of these numbers. After having a phone call from slum dwellers, we all are ready to help them in any possible ways.’

The second objective of this study was about support system that BRAC HNPP provides to Shasthya Karmi’s in mHealth care services. To address this objective, it was reflected that the training provided by BRAC HNPP is important for the competency and increasing Shasthya Karmi’s skills for providing health care services door to door for the slum dwellers in a limited resource context.

BRAC HNPP providing support to Shasthya Karmis’ in two ways. One is by providing training on healthcare management, training on technology management and training on maternal, neonatal, child health, tuberculosis and other basic disease just after join in the BRAC HNPP (63). It is related to the step of acquisition in the knowledge transfer process through mobile phone. In total 60 responses were found from 24 Shasthya Karmis where they focused the knowledge acquisition process through three types of trainings. These training programs basically focus on health management training (36), technology management training (18), and training on women reproductive health (6). Health management training refers to basic healthcare issues, nutrition, pneumonia, breast feeding and maternal health training that help to get insight knowledge about how to primarily deal with these diseases? Currently, mHealth is the predominant technological platform for mobile based health service delivery in the country, mainly established around consultation via call centers and SMS. For gaining depth & technical knowledge on mHealth, technology management training focuses on how to input household data, location set up using GPS (Global Positioning System), taking photo and set into the mHealth system. Training on this area make the Shasthya Karmi’s confident to provide relevant knowledge for the slum dwellers. In the same way, training on basic diseases and their treatment will help Shasthya Karmis’ to provide effective solution to slum dwellers. Therefore, BRAC HNPP providing a great support by providing knowledge and

competencies to Shasthya Karmis through training.

Another support system is to provide medical equipment to Shasthya Karmis' that they can detect diseases, examine slum dwellers' health condition and provide better solution through medical equipment (70). Medical equipment including BP machine, stethoscope, thermometer, salter scale, tape and tuberculosis pot for sputum collection. Medical equipment facilitates to identify healthcare problem associated with slum dwellers.

The third objective was to identify the barriers of using mobile phone to transfer healthcare knowledge among slum dwellers in a limited resource context. To address this objective, we asked the question 'what kind of difficulties do you face during contact with patients in slum areas?' directly to interviewees. The findings show that, there are some sociocultural as well as technical barriers are existing. In total 27 responses were found from 24 Shasthya Karmi's where most of responses (12) who have faced sociocultural barriers during work in slum areas. These are including barriers to talk and get household information, poverty, unwilling to get family planning advices due religious faiths. Bangladesh is a country with 89.1% of the population as Muslim, 10% Hindu, and other is 0.9% including Buddhist and Christian. The findings suggested that the Islamic cultures have strong impact on health attitude, beliefs, and perceptions of maternal, neonatal, and child health in slum areas in Bangladesh.

mHealth is blessing for the poor people in many developing countries due to its convenient features, easy to use and sending information in more cheap way than other mediums. Half of the respondents replied that they do not face any difficulties and they do not have any barriers with mHealth services while they provide services to the slum dwellers. It is very significant for the present study as Shasthya Karmi's feel comfort with the mobile technology.

Despite the implementation of mHealth in slum areas of Bangladesh, health service providers and recipients face technological challenges from several viewpoints. Few respondents (3) expressed that slum dwellers don't like to give their picture for mHealth registration. Slum peoples still are not aware about technological features because of their lack of knowledge. These findings are supported by the study conducted in Bangladesh where they found that technical problems are still exists in implementation of information and communication technologies for health there in national level (Islam

and Tabassum, 2015).

5.3.3 Well-being output

One example of providing mobile healthcare services is the provision of information about risk signs during pregnancy to a pregnant woman by a Shasthya Karmi using a mobile phone to show a video. The video also instructed pregnant women to give birth at a local hospital or healthcare centre with the help of a skilled birth attendant. This led to a drop in the number of home deliveries with an unskilled birth attendant from 84% to 13% and in maternal mortality per 100,000 live births from 294 to 130 over a five-year period according to Marcil, et al. (2016).
Another example is the provision of nutritional information to residents of the slum communities where Shasthya Karmis are working and most of the children suffer nutritional deficiencies. Shasthya Karmi's along with Shasthya Sebikas' are providing information about how to prevent nutritional deficiencies in children less than 5 years old. In her interview, one Shasthya Karmi expressed her opinion about children's' health:

"*We are working to not only improve maternal health but also to improve child health. We take care of all children less than five years old, even during the prenatal stage. After birth, we suggest breast feeding only up until six months of age. After that, we provide nutritional information about how to manage the child's nutritional balance. In addition, we provide nutrition packs to accompany a daily meal."* (Shasthya Karmi no. 20; Age: 45; Area: Badda Slum, Gulshan, Dhaka)

5.4 Main findings from co-occurrence analysis

For the results of the Shasthya Karmi's, as shown in the figure 5-1, there are five clusters. The word "phone" has a tight link with the words "information", "collect", and "household"—this is about the Shasthya Karmi's work style of using mobile phone. The word "phone" also has links with other clusters. The co-occurrence map shows a direct relation of mobile with "phone", "information", "collect", and "household". It also shows a relation between taking a picture for household registration and showing a video to pregnant women through a mobile phone. In addition, the map shows that the Shasthya Karmi ("we") maintain a register book and collect data to send to the main server through a mobile phone. This type of complex system gives an idea of the complex mechanism of healthcare knowledge transfer through mobile phone. From these words on the map, we can see that a group of entities related to mobile phones is a suitable mechanism for healthcare knowledge transfer not only to slum dwellers but also to BRAC HNPP.

BRAC HNPP Shasthya Karmis' are paid health workers with a minimum of ten years of prior schooling. Their provision of services is strengthened by the support and supervision of their program manager. Each Shasthya Karmi supervises the activities of ten Shasthya Sebikas'. An Shasthya Karmi accompanies each of her Shasthya Sebika's on field visits, monitoring and evaluating their activities and helping them solve problems encountered while delivering services. The Shasthya Karmi's also help with technical knowledge to the Shasthya Sebika's to identify people with tuberculosis, glaucoma, etc. and provide information to women who are unaware of family planning. They collect household information including the names and ages of the family members and the family's income and overall health status. During home visits, they show a video on their mobile phone to pregnant women that explains the various risk signs that may appear during pregnancy. In short, the Shasthya Karmi provides healthcare services, administers primary treatment for common illnesses, and provides information to and shares knowledge with people in slum communities.

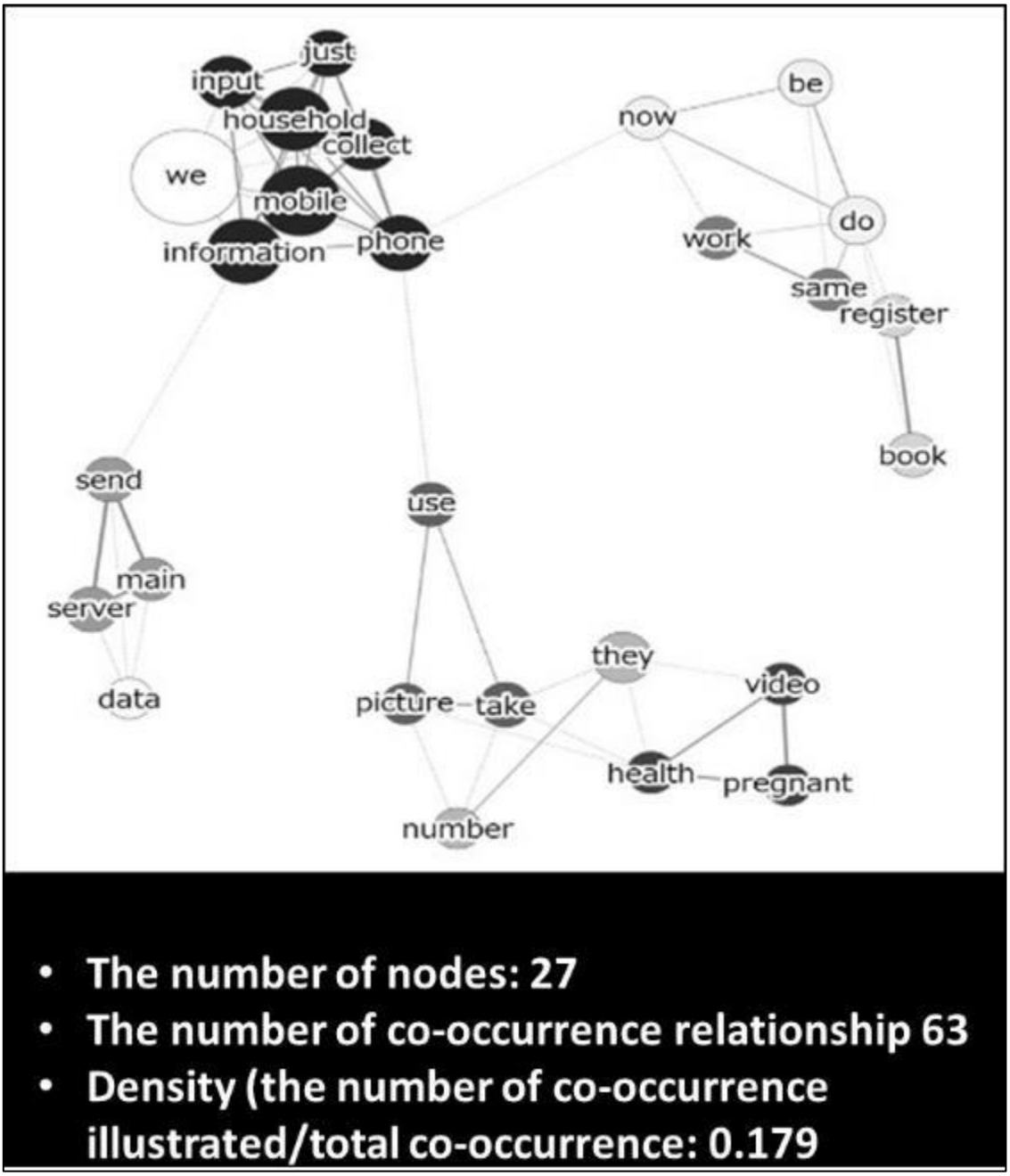

Figure 5-1 Result of co-occurrence network analysis of Shasthya Karmi.

From the findings above, we were able to identify two unique ways in which

Shasthya Karmis' are used mobile Health (mHealth) to transfer healthcare knowledge. The first way was the acquisition and provision of healthcare information, and the second was the keeping of patient records in the mobile-based computer system. In addition to providing support during home visits, the Shasthya Karmis' provide support through their mobile phones. Residents can contact them if they face difficulties with their health. Such support was made possible by the implementation of BRAC mHealth, a service used to keep client records and to build a comprehensive healthcare database, thereby providing point of healthcare services to community residents. The shsthya karmis' are responsible for implementing mobile healthcare services in slum areas.

Table 5-2 Descriptive statistics of *Shasthya Karmi* interview result.

Noun	#	Personal pronoun	#	Adj	#	Adv	#	Verb	#
information	30	we	60	mobile	35	just	11	collect	16
household	28	they	15	main	7	now	7	do	12
phone	20	it	6	same	6			be	10
input	17	I	5	pregnant	5			send	9
server	9							take	9
book	8							use	8
work	7								
health	6								
register	6								
video	6								
number	5								
picture	5								
data	5								

One example of providing mobile healthcare services is the provision of information about risk signs during pregnancy by using a mobile phone to show pregnant women a video that also advises pregnant women to give birth at a local hospital or healthcare center with the help of a skilled birth attendant. This led to a drop in the number of home deliveries with an unskilled birth attendant from 84% to 13%, a drop in the maternal mortality rate per 100,000 live births from 294 to 130, and a reduction in the neonatal mortality rate per 1000 live births from 42 to 17 over a five-year period (Marcil et al., 2016).

5.5 Discussion and model development

From the above findings based on empirical interview data and theoretical background, we extend Liyanage *et al.,* (2009) knowledge transfer process model. It reveals how mobile technology could (mHealth) impact on healthcare knowledge transfer in slum areas of Bangladesh as shown in the figure 5-2. Knowledge transfer is an activity or act of collaboration between knowledge provider and knowledge receiver; whilst the technology sheds some lights on how to efficiently and smoothly transfer knowledge into a usable form to slum dwellers. The model shown in bellow is to be seen from left to right. The model mainly developed based on two main elements, i.e. knowledge provider and knowledge receiver. As overall knowledge provider BRAC HNPP providing knowledge to Shasthya Karmi's and Shasthya Sebika's through trainings and workshops. Shasthya Karmi's have direct interaction with BRAC, Shasthya Sebika's and also with slum dwellers. Therefore, Shasthya Karmi's can disseminate or transfer health knowledge directly to slum dwellers.

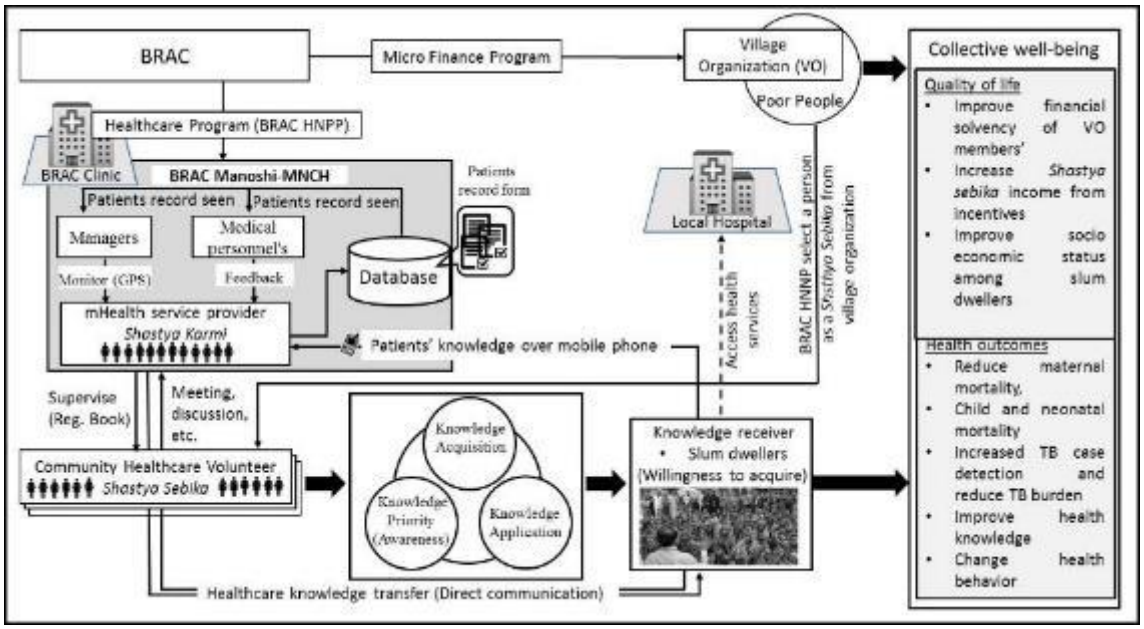

Figure 5-2 Healthcare Knowledge Transfer model.

In this knowledge transfer process, technology i.e. mobile phone works as enabler tool which facilitates to transfer and disseminate knowledge in more efficient and effective way. The next step is to acquire knowledge which indicates the ability and willingness to provide and receive healthcare knowledge in order to improve health well-being or QOL. This steps name is knowledge acquisition. On one side, Shasthya Karmi's are responsible to transfer knowledge as an employee of BRAC HNPP. Therefore, Shasthya Karmi's are somewhat willing to transfer knowledge to slum dwellers. To do so, Shasthya Karmi's are gaining ability to transfer by several trainings that the BRAC HNPP provided. On the other hand, slum dwellers are in healthcare venerability. To rescue from the health vulnerability by themselves, slum dwellers seeks health knowledge and having direct interaction with knowledge providers i.e. Shasthya Karmi's. Slum dwellers are gaining ability to absorb healthcare knowledge tacitly that Shasthya Karmi's are provided. Once slum dwellers acquire health knowledge, it doesn't mean the knowledge transfer process is finished. As (Liyanage et al., 2009) argued that, "the acquired knowledge requires some sort of a conversion of knowledge in order to make it 'useful' for the knowledge receiver where they can produce new knowledge or improve existing knowledge, skills or capabilities".

In this healthcare knowledge transfer model, Shasthya Karmi's acquiring knowledge from BRAC HNPP will be useful when they can absorb it fully and can apply to transfer again to slum dwellers. In that case, BRAC HNPP is the knowledge provider are Shasthya Karmi's are knowledge receivers. Again, slum dweller's acquiring knowledge from Shasthya Karmi's will be useful when they can absorb it fully and can apply to meet their needs and demands (to cure from diseases or manage their health). In that case, Shasthya Karmi's are knowledge provider are slum dwellers are knowledge receivers. This step is knowledge application, and it is the most important step for in the healthcare knowledge transfer process. Because, with the end of this step, knowledge will be the useful for end users i.e. useful for slum dwellers. In this step, slum dwellers might be found a few errors or knowledge discrepancy with their needs and demands. Therefore, slum dwellers will provide or will be asked by Shasthya Karmi's or Shasthya Sebika's to provide feedback that Shasthya Karmi's or Shasthya Sebika's or BRAC HNPP can further improve their knowledge base and can transfer again with lowest discrepancies. Then, both knowledge providers and receivers will be benefited equally.

Technology intervention with knowledge transfer process can facilitate transfer in several ways. First, mobile phone is not so complex technology and the diffusion rate of mobile phone is very high even in slum areas. Therefore, from the knowledge receiver perspective, maximum users can operate it very smartly and would be easy to get healthcare knowledge 24/7 with cheap prices. Second, mobile based household data collection would help to build a strong database which will help to provide quality healthcare services in future. From now and then, healthcare database would be very important for future electronic medical record (EMR). Third, government, private-partnership, non-government health service providers of developing countries can enhance their services and works towards efficient healthcare services delivery alternatives in achieving quality health care for all especially can reach to unreached people (Motamarri et al., 2012). To the end, slum dwellers benefits are indicating in their health outcomes such as reduce maternal, neonatal, and child mortality, reduce tuberculosis burden, reduce malnutrition among children and pregnant mothers, and overall improve slum dwellers health well–being and QOL.

5.6 Conclusion

The present study responses brought forth a rich set of findings within limited size of sample. The primary contribution of the study is the healthcare knowledge transfer model based on empirical data for improving health well-being and QOL of slum dwellers. The findings and the model have important implications for more in-depth research and practices in healthcare services regarding healthcare knowledge transfer to vulnerable people. The model can serve as a starting point to develop business and services strategies for change services order with technological advancement and could possible to extend outside the healthcare settings. This study has successfully established the technological interventions and works as knowledge enabler in healthcare knowledge transfer. Overall, findings of the study make it evident that mobile technology transforms healthcare

knowledge transfer in improving maternal, neonatal, and child health by making aware, acquire, and apply the transferred knowledge and improving health well-being as well as QOL among slum dwellers.

Chapter 6 Transformative Service System Model for Healthcare Services Access in a Limited Resource Context

6.1 Concept

Based on the findings from the two studies and theoretical background, a model of transformative healthcare service system has been developed, as shown in the figure 6.1. The model illustrates how BRAC HNPP develops and efficiently utilizes human resources and technology to provide essential healthcare and to transfer healthcare knowledge in a limited resource context.

The major contribution of this study is to propose a theoretical model of transformative healthcare service system for access to the healthcare services in a limited resource context. Based on the findings from two studies (chapter 4 and chapter 5), literature review, research questions and theoretical background, we propose the theoretical model for our study shown in the figure 6-1. The model illustrates how a healthcare service provider can develop and efficiently utilizes human resource and technology to provide essential healthcare services and to transfer healthcare knowledge to rural and slum people in a limited resource context. The model is to be explained from the left to right. It contains five key elements in this study- addressing 'limited resources'

in healthcare, development and retaining of human resource for health, healthcare knowledge transfer, improving healthcare service access, and improving well-being.

The first part of the model on the left refers to addressing 'limited resources' in healthcare. In a limited resource context, healthcare organization faces various kinds of impediments to deliver healthcare services to unserved and underserved peoples. Especially it is difficult to deliver healthcare services to those who are living in rural and slum areas. Several impediments have been identified which includes shortage of human resource for health, lack of healthcare knowledge among healthcare service providers and recipients, and inadequate healthcare services facilities in rural and urban slum areas. In these regards, the study proposes a theoretical model for access to healthcare services in a limited resource context.

The second part of this model indicates the development and retaining of human resource for health. Healthcare service provider uses a micro-credit system to support the provision of community health workers in areas with limited resources. The community health workers transfer healthcare knowledge to rural residents and earn money by selling medicines to them. Community health workers are thus motivated by the opportunity to earn money as well as by the opportunity to improve the capabilities of the local community. Through their interactions with local community, community health workers receive intangible benefits such as reputation as an opinion leader.

The third part of this model indicating the healthcare knowledge transfer to peoples who have lack of knowledge among service providers and recipients. Regarding the healthcare knowledge transfer process, healthcare service provider provides basic healthcare knowledge to supervisors of community health workers' and to community health workers through training sessions and workshops. In particular, the transfer of knowledge follows a hierarchical structure, from the managers of healthcare service provider to the supervisor of community health workers', from the supervisor of community health workers to the community health workers', and finally from the supervisor of community health workers' and community health workers to the local residents.

The supervisor of community health workers enters the household information they collect into their mobile phone and then hit the send button to transfer it to the healthcare service provider's server. All of the collected information can be viewed by

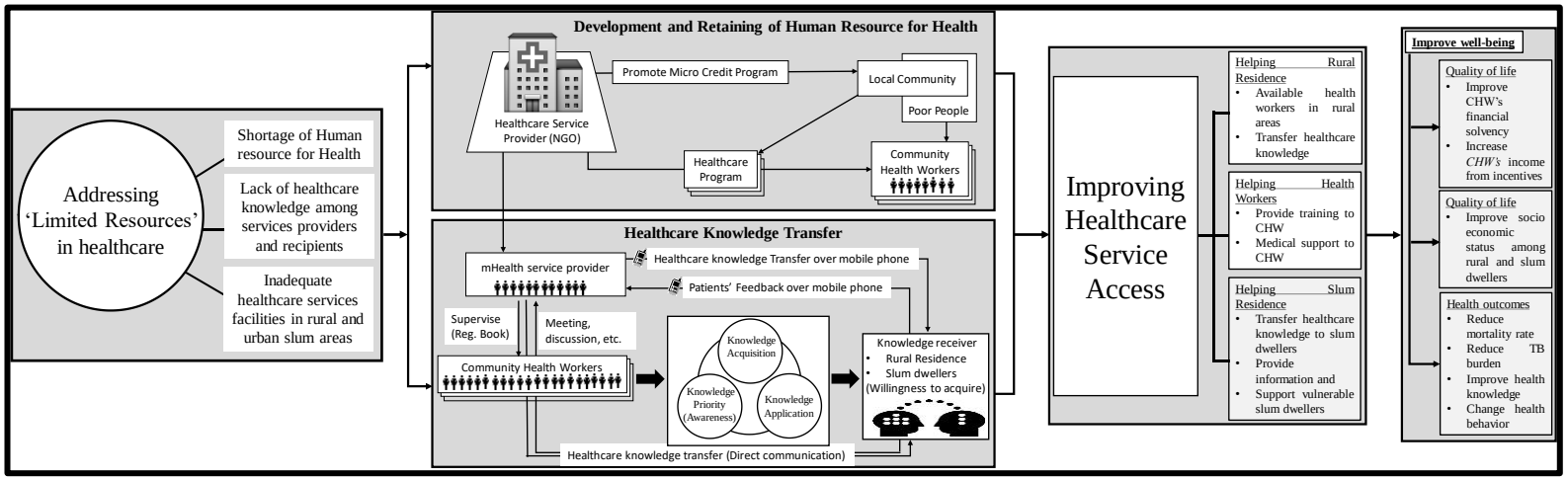

Figure 6-1 Transformative service system model for healthcare services access in a limited resource context.

healthcare service managers and medical personnel who have a need to know. The managers can track the locations of the supervisor of community health workers' when they are working because the phones have GPS capabilities. The medical personnel can use the information to help prepare a healthcare solution before visiting the patient's home. Therefore, fewer managers are needed to monitor the activities of the supervisor of community health workers', thereby enabling the supervisor of community health workers to increase speed of knowledge transfer activities through the mobile phone.

Slum and rural residents tend to have healthcare vulnerability due to limited access to healthcare information. They can reduce this vulnerability by directly interacting with their supervisor of community health workers' over mobile phone. For example, if their knowledge is insufficient for their needs and demands, they can contact their supervisor of community health workers' over mobile phone and request for more information.

The overall aim of the 'development and retaining of human resource for health' and 'healthcare knowledge transfers' is to improve healthcare service access for unserved and underserved peoples in rural and slum areas in a limited resource context. By developing and retaining community health workers as human resource for health, healthcare service provider can make sure the availability of community health workers in rural areas. If so, in one hand, community health workers can help to provide healthcare knowledge and information to rural residence. On the other hand, supervisor of community health workers and community health workers can help and support vulnerable slum dwellers by transferring healthcare knowledge and providing information to them.

Finally, the last part of this model refers to the final outcomes of improving healthcare service access is the improvement of well-being. The well-being can be seen from healthcare service providers' and recipients' perspective. From the providers' perspective, community health workers can improve their financial capability through their earnings from medicine sells incentives. Incentives are including from patient reference, detection of TB patients, attending in technical meeting and training organized by government and nongovernment organizations, workshops, and so on. In addition, community health workers can improve their socioeconomic status as an active borrower of microcredit program. As a result, community health workers can be improved their

quality of life which can be seen as well-being. Well-being from service recipient perspective, the improvement of healthcare service accessibility in rural and slum areas would changes from ‘lack of access’ to ‘access’. Therefore, the health status of rural and slum residence will be changed from worst condition to better condition. The improvement and changes of health status among rural and slum residences can be seen as the well-being of them.

6.2 Practical implication

By combining human resource supply and knowledge transfer, transformative healthcare service system creates transformative service value that the value creates for both entities (service providers and service recipients) after having knowledge transfer from healthcare service provider to healthcare service recipients in the limited resource context. According to Anderson et al. (2013), the transformative value is, as found in study 2, the system contributes to reducing unskilled birthing assistance, maternal mortality, neonatal mortality, and child nutrition deficiencies at service recipient side, and improve extrinsic and extrinsic value at service providers side.

Regarding healthcare service models, there are different types of models including different mission and training systems in developing countries. All of these models have emerged to promote healthcare services in limited resources area. In the table 6.4 represent models that summarize current Nine healthcare system models’ in developing countries in terms of collaboration, resource integration, and trainings. Given the priorities on approaches, similarities and dis-similarities between missions, characteristics, interests and professional needs through collective action and representation, the study compared the present model with existing models in table 5.4 which are retrieved from the Center for Health Market Innovations (CHMI).

6.2.1 Model selection procedures from CHMI database

CHMI is the database provides information on over 1400 innovative healthcare programs operating by profit, non-profit, public-private partnerships in low and meddle income countries in the world. All of these programs are providing quality healthcare services to the world's poor. The CHMI database systematically collected information and making profiles on all healthcare program. To do so, the CHMI database divided all programs into five categories for improving quality, affordability, and accessibility of healthcare services for the vulnerable peoples around the globe. The five categories including its definitions are provided in the table 6-1.

Table 6-1 CHMI Categorizations of innovations; Source: adopted from (Krubiner et al., 2016).

Category	Definition	Approaches
Organizing Delivery	Programs that reduce fragmentation and informality of health care delivery and that may enable financing, regulation, training, and new business models.	Franchises, cooperatives, health service networks, health service chains, and professional associations
Financing Care	Programs that mobilize funds for health care and align provider incentives to increase access for targeted groups of patients or to support select health interventions.	Contracting, vouchers, cross-subsidization, government health insurance, health savings, micro-insurance
Regulating Performance	Programs that set standards and enforce or incentivize higher quality care or increased access for target populations.	Monitoring standards, expansion incentives, licensing/accreditation, pay-for-performance, policy legislation
Changing Processes	Programs designed to change the behavior of individuals involved in health care transactions by educating patients about what kind of care to seek or providers about how to deliver higher quality services.	Provider training, consumer education, social marketing, consumer association, conditional cash transfers
Enhancing Processes	Processes, technologies, or products that facilitate increased efficiency, lower costs, higher quality, and/or improved access.	Information communications technology, lab testing/diagnostics, products/equipment, mobile clinic, supply chain enhancements, innovative operational processes

From the CHMI database, we searched with specific keywords. First of all, the

study focusing on limited resource context which means developing countries where healthcare facilities including human resource for health, healthcare infrastructure and healthcare technologies are limited. Therefore, we decided first key work "developing country" and constant it for every search. Similarly, we fixed another keyword "phones" as our study focusing on healthcare knowledge transfer through mobile phone, "Maternal, new-born and child health" as the present study focusing knowledge transfer on specific topic, and "non-profit" organization as our study used a specific case on a non-profit organization "BRAC HNPP". With these fixed keywords, we searched with five other key words; ,changing behavior, enhanching process, organizing delivery, financing care and regulating performance to find existing mHealth models in a limited resource context as presented in the Table 6-2, search findings are presented in the table 6-3. Apart from this search, we then reviewed 9 (Nine) Health services system models in developing countries in terms of collaboration, resource integration, technology interventions and trainings based on (Krubiner et al., 2016).

Table 6-2 Search criteria to find mHealth models in developing countries was as follows.

Number of Search	Country focus	Technolog	Health focus	Profit Status	Approaches
Search 1	Developing Countries	Phones	Maternal, newborn and child health	Non-profit	Enhancing process
Search 2	Developing Countries	Phones	Maternal, newborn and child health	Non-profit	Changing Behaviour
Search 3	Developing Countries	Phones	Maternal, newborn and child health	Non-profit	Organizing Delivery
Search 4	Developing Countries	Phones	Maternal, newborn and child health	Non-profit	Financing Care
Search 5	Developing Countries	Phones	Maternal, newborn and child health	Non-profit	Regulating Performance

6.2.2 Different types of mHealth services models from CHMI database

Table 6-3 Different types of mHealth services focused on maternal, newborn and child health.

No.	Name of Project	Country	Approaches				
			Changing Behavior	Enhanching process	Organizing Delivery	Financing Care	Regulating Performance
1	Living Goods	Kenya/Uganda	●	●	●		
2	mothers2nothers	Lesotho, Malawi, Rwanda, South Africa, Swaziland, Tanzania, Uganda, Zambia	●	●			
3	Merrygold Health Network	India	●	●	●	●	●
4	Child In Need Institute (CINI)	India	●	●	●		●
5	Gram Vikas Navyuvak Mandal Laporiya (GVNML)	India	●				
6	ProFam, Benin	Benin	●	●	●		●
7	Sun Quality Health Network, Cambodia	Cambodia	●	●	●		●
8	BlueStar Pilipinas	Philippines	●	●	●		●
9	Jacaranda Health	Kenya	●	●	●	●	
10	Healthy Baby/Healthy Life Vouchers	Uganda	●			●	

Table 6-3 Continued

No.	Name of Project	Country	Approaches				
			Changing Behavior	Enhanching process	Organizing Delivery	Financing Care	Regulating Performance
11	Action research and Training for Health (ARTH)	India	●				
12	Sir Ganga Ram Hospital	India	●	●			
13	Society for Education, Action and Research in Community Health	India	●	●			
14	Mobile Technology for Community Health (MoTeCH)	Ghana	●	●			
15	Prosmiling Terpadu	Indonesia	●	●		●	
16	Tello Mobile Clinic (TMC)	Indonesia	●	●			
17	Mahila Swahsta Sewa	Nepal	●		●		
18	D-tree International	India, Malawi, Mali, Tanzania	●	●			
19	Children's Health and Development in Kenya (CHADIK)	Kenya	●	●			
20	Malezi-Bora	Kenya	●	●			
21	ColaLife	Zambia	●	●			
22	Mobile Interactions bringing Hope (MI Hope)	Kenya, Nigeria, South Africa, Zambia	●	●			
23	Djantoli	Mali	●	●	●	●	
24	Baby Monitor	Kenya	●	●			
25	Fistula Hotline	Sierra Leon	●	●			
26	Safe Mothers, Safe Babies	Uganda	●	●			
27	Aponjon	Bangladesh	●	●			
28	Association of Private Health Facilities in Tanzania (APHFTA)	Tanzania	●				●
29	Global Health Media Project	Global	●	●	●		
30	Aga Khan Development Network eHealth Resource Centre	Afghanistan, Kyrgyzstan, Pakistan, Tajikistan, Tanzania	●	●	●		●
31	Mat Troi Be Tho	Vietnam	●	●	●		
32	Zindagi Mehfooz (Safe Life) Program	Global	●	●			
33	Community Health Nurse on the Go (CNH)	Ghana	●	●	●		
34	Jamii Smart	Kenya	●	●		●	

Table 6-3 Continued

No.	Name of Project	Country	Approaches				
			Changing Behavior	Enhanching process	Organizing Delivery	Financing Care	Regulating Performance
35	Medic Mobile	Bangladesh, Cameroon, Democratic Republic of the Congo, Ethiopia, Guatemala, Haiti, Honduras, India, Kenya, Malawi, Mali, Mexico, Nepal, Nigeria, Panama, Senegal, Tanzania, Uganda, United States	●	●			
36	The Ihangane Project	Rwanda	●	●	●		
37	Health Builders	Rwanda	●	●	●		●
38	Possible Health	Nepal		●		●	
39	BRAC Manoshi	Bangladesh		●			
40	Child Count+	Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania, Uganda		●			
41	Sajida Foundation Health Program	Bangladesh		●	●	●	
42	M-CHANJO	Kenya		●			
43	M-Afya Kiosks	Kenya		●	●		
44	VaxTrac	Benin		●			
45	M-Vaccine	Kenya		●			
46	Micro Health Franchise System (UmeedSey)	Pakistan		●	●		
47	Energize the Chain	African Continent		●			
48	Winsenga eFHR	Uganda		●			

Table 6-3 Continued

No.	Name of Project	Country	Approaches				
			Changing Behavior	Enhanching process	Organizing Delivery	Financing Care	Regulating Performance
49	Mobile Phones for ttC/MNCH in Sierra Leon	Sierra Leon		●			
50	Wazazi Nipendeni	Tanzania		●			
51	MIRA Channel (Women Mobile Lifeline Channel)	India		●			
52	Safe Deliveries	Tanzania		●			
53	CycleTel Humsafar	India		●			
54	Mama Rescue	Rwanda		●	●	●	
55	World Health Partners (WHP)	India, Kenya		●			
56	AMUA	Kenya			●	●	
57	BlueStar Vietnam	Vietnam			●	●	
58	Ad-din Ambulances	Bangladesh			●		
59	Arrow web Hospital	Kenya			●		

Table 6-4 (retrieved from CHMI) compares the model for BRAC HNPP with those for healthcare systems in other developing countries in terms of mission, resource integration, and training. The first four programs are Merrygold health Network, Protection de la Famille (ProFam), Sun Quality Health Network and BlueStar Pilipinas adapting as Social Franchising Health Services Network, focusing on developing frictional, clinical and social franchises and regulating performance in order to improve provided healthcare services. The next 2 (two) programs Health Builders and Dijantoli are Health Services Network are devoted to strengthening healthcare services system through an improvement of existing healthcare services facilities. Then the 2 (Two) programs Child In Need Institute (CINI) and Jacaranda Health are Health Services Chain focusing on primary and maternal healthcare, combines business and clinical innovations to provide affordable services to target populations. The rest of the program Aga Khan Development Network eHealth Resources Centre is combining the both chain and network approaches in order to develop, eHealth program, strategies, application and capacity building. Brief descriptions of all programs are summarized and compared bellow.

Merrygold Health Network (MGHN) is a non-governmental organization that initially provides maternal and child health services in Uttar Pradesh state of India at affordable

prices. The organization MGHN comprises with the 7020 bedded Mrerrygold hospitals, 700 Merrysilver clinics and 10000 Merrytarang workers and covering more than 50% of geographic areas of Uttar Pradesh.

In doing so, the MGHN integrated information and communication technology with existing facilities in order to improve overall performance in healthcare services. The MGHN uses mobile phones as healthcare delivery tool to improve data collection, organization, and analysis for identifying better healthcare service that poorer to be needed. In addition, the MGHN provides opportunities to improve patients access to information and encourage health seeking behaviours such as health education & training.

Protection de la Famille (ProFam) is a clinical franchise that initially provides and facilitates family planning and reproductive health, HIV/AIDS and Maternal, newborn and child health services to women in Benin. With 201 medical outlets, ProFam, Benin provides a variety of general primary care including maternal, neonatal and child health services, distributing contraceptives, diagnostic testing and treatment, prevention of mother to child transmission, HIV counselling and testing, and antenatal care.

Regarding mHealth services, ProFam, Benin developed toll-free hotline and offers customers to get information on HIV, family planning, and related services from ProFam clinics. The mHealth service system is providing the opportunity to improve communication between health service providers and patients.

Sun Quality Health Network, Cambodia is a fractional franchise of 83 health providers in Cambodia. Sun Quality Health Network is expanded their program nationwide with a network of 250 maternity homes operating in 19 of the 24 provinces in Cambodia. They are providing a variety of healthcare services including vaccination, labor and delivery, antenatal care, malaria testing and treatment, family planning/ reproductive health, maternal and child care, and emergency obstetrics care services.

The Sun Quality Health Network is planning to broaden their activities include linkage of select services to health insurance, vouchers, and equity funds to increase access to and choice of reproductive health services. In addition, they have a plan of expansion of health areas especially tuberculosis diagnosis, pneumonia and high blood pressure treatment.

BlueStar Pilipinas is a family planning social franchise operated by licensed midwives in 200 clinics in Philippines. The mission of BlueStar Pilipinas is to improve access to affordable quality family planning services. To ensure quality of health services, health

service providers receive training on family planning knowledge, counselling, clinical skill, marketing and business management.

Regarding mHealth services, BlueStar Pilipinas uses mobile phone technology to communicate with customers and franchisor also. The mHealth service system is providing the opportunity to improve communication between health service providers, patients and franchisor.

Health Builders is a non-governmental organization that is devoted to strengthening healthcare services system through management, infrastructure, and technology initiatives so that every person has access to high quality healthcare. They set a vision to achieve the access to high quality healthcare services for every person and allowing them to live dignified, healthy, and prosperous lives.

Health Builders uses mobile phone technology in order to improve healthcare delivery in resource-limited communities. After working with communities to identify their greatest needs, the Health Builders purchase and installed technological solutions that are durable and easy to use. The mobile phone technology intervention improves communication between health providers and patients outside of traditional doctor visit. In addition, mobile phone technology improves patients access to information and encourage health seeking behaviours, make financial transactions more efficient, and connect health providers and patients in place a traditional doctor visit.

Dijantoli (formaerly Pesinet) is aiming to sustainably reduce child mortality by facilitating access to existing healthcare services systems. Especially Dijantoli designs their healthcare services for children and mothers who are living in a long distance from healthcare services facilities and cannot access healthcare services when they sick for cultural, financial and geographical barriers.

Dijantoli uses a mobile phone system to input children data and stored on a Java applet in the agent mobile phone. The stored data transferred to the doctor through mobile technology. Doctors analysis the data and reviews every day on a web interface at the healthcare facility, identifies children health problem and provide treatment based on disease. In addition, the mobile phone technology facilitates the communication between health providers and patients, improve a health provider's ability to diagnose and treat patients, and improve real time assistance with clinical decision making. Apart from these improvement, mobile phone technology provides opportunities to collect, organize and

analysis of data and financial transaction more efficiently.

Child In Need Institute (CINI) is a registered non-government organization that initially provides and facilitates nutrition, health, education and protection services to poor and marginalized children and women in villages and slum areas in West Bengal, India.

In doing so, the CINI integrated information and communication technology with existing facilities in order to improve overall performance in healthcare services. The CINI uses mobile phones as healthcare delivery tool to improve communications between health providers and patients outside of traditional doctor visit.

Jacaranda Health is a social enterprise which operates a fully self-sustaining and scalable chain maternity clinic in Kenya. The Jacaranda Health mission is to provide affordable, high-quality maternal and child health to poor urban women. The Jacaranda health program operated two maternity hospitals in peri-urban Nairobi and plans to expand across East Africa by 2019 in order to provide high-quality and affordable maternity care in areas where access to healthcare services are limited.

Jacaranda uses a mobile phone system to improve communication between health providers and patients. In addition, Jacaranda Health using the mobile technology to improve client data collection, organization and analysis in order to track health trends. When clients go home, they get customized health tips and scheduling reminders through SMS. They distribute patient satisfaction surveys through mobile phones that give valuable information about how to improve the care. Clients can also call a 24-hour Jacaranda customer care hotline. They also have a mobile payment option, MamaKiba (meaning “MotherSavings”), to enable mobile pre-payment service.

Aga Khan Development Network eHealth Resource Centre is a Pakistan based development organization working for improvements in access, quality, cost, efficiency and safety of health care through information and communication technologies. The center supports the development and improvement of eHealth in Asia and Africa.

The Aga Khan Development Network eHealth Resource Center uses mobile phone technology to improve a health provider's ability to diagnose and treat patients, improve training or real-time assistance with clinical decision making and to improve data collection, organization, and analysis in order to develop and provide quality healthcare services. In addition, they use remote diagnostic tool and PDA to improve patients access to information and encourage health seeking behaviours, and to virtually connect health

providers and patients in place of a traditional doctor visit.

Table 6-4 Co-ops, mission and resource integration including strategic partnership of healthcare models.

Program	Country	Mission	Human development	(Mobile) Technology usage	Strategic partnership
Bangladesh Rural Advancement Committee (BRAC) Health, Nutrition and Population Programme (HNPP)	Bangladesh	To provide maternal, neonatal and child health, tuberculosis control and cure, malaria control and cure, nutritional treatment for 0-5 years old children and adolescent healthcare services.	Recruit paid and voluntary healthcare staffs for delivering healthcare services to door-to-door in rural and urban slum areas of Bangladesh. Provides training and motivation to scale up health providers' skill and knowledge on healthcare services and retaining in the health system.	Developing human resource for health service delivery by recruiting and retaining in the health system. Similarly, adopted into technological uses for effective and efficient health delivery for rural and urban slum populations who are unreached and underserved. BRAC HNPP collect and store healthcare data and analyse for further service improvement.	Partnership with national and international agencies, government, Universities and foundations. BRAC HNPP have strong collaboration with 'Health, Nutrition and Population Sector Programme (HNPSP)' of the Government of Bangladesh, The National Malaria Control Programme (NMCP), UKAID, USAID, UN, WHO, Bill & Melinda Gates Foundations, John Hopkins University, and with many others.
Merrygold Health Network (MGHN)	India	To provide maternal and child health services through frictional franchises and regulating performance	Auxiliary nurses midwives (ANMs) and accredited social health activists (AHHAs) to establish strong referral supports.	Mainly peoples-based healthcare delivery approaches. Uses mobile phone as health intervention to collect healthcare data and to improve patients access to information and encourage health seeking behaviours.	Partnership with United States Agency for International Development (USAID), Hindustan Latex Family Planning Promotion Trust (HLFPPT), State Innovations in Family Planning Project Services Agency (SIFPSA), and Government of Uttar Pradesh, India.

Table 6-4 Continued

Program	Country	Mission	Human development	(Mobile) Technology usage	Strategic partnership
Protection de la Famille (ProFam)	Benin	To provide family planning and reproductive health, HIV/AIDS and maternal and child health services through clinical franchises in Benin.	ProFam provides refreshers training and on-site coaching to CHW to address areas of low performance.	Mainly people-based clinical franchise, regulating and monitoring franchisees performance. In doing so, ProFam uses mobile phone technology in order to improve communication between ProFam and franchisees. On the other hand, franchisees are using mobile phone to improve communication	Not found
Sun Quality Health Network	Cambodia	To provide vaccination, labor and delivery, antenatal care, malaria testing and treatment, family planning/reproductive health, maternal and child healthcare, and emergency obstetrics care services.	Sun Quality Health Network is a frictional franchise. They regulate and monitor maternity home clinics, franchise performance benchmarking, and organize personalized coaching for networked providers.	Mainly people based franchising network, uses mobile phones to improve communication between franchisor and franchise.	Not found
BlueStar Pilipinas	Philippines	To provide family planning and reproductive health, HIV/AIDS and maternal and child health services through clinical franchises in Benin.	BlueStar pilipinas is a social franchise, regulate and monitor franchisees performance and provides training in areas such as family planning knowledge, counseling, clinical skills, marketing and business management.	BlueStar Pilipinas uses mobile phone technology in order to improve communication between service providers, patients and franchisor.	Partnership with local health authorities, national and international agencies, organizations and universities.

Table 6-4 Continued

Program	Country	Mission	Human development	(Mobile) Technology usage	Strategic partnership
Health Builders	Rwanda	To provide Maternal, newborn and child health, Pharmacy services, Primary care to rural residence in Rwanda.		The mobile phone technology intervention improves communication between health providers and patients, improves patients access to information and encourage health seeking behaviors, make financial transactions more efficient, and connect health providers and patients.	Partnership with General Electric, Meyer Family foundation, GSBI, Segal Family Foundation, GE Foundation, Primary Care international, UNICEF, Columbia University.
Dijantoli	Mali	To provide healthcare services to children and mothers who are living in a long distance from healthcare services facilities and aiming to reduce child and maternal mortality.	Consumer education such as organize collective talks with local mothers' to raise awareness on diarrhoea, malaria and breastfeeding in order to improve their health practices.	Dijantoli uses a mobile phone system to input children data, store and transfer to the doctor. In addition, the mobile phone technology facilitates the communication between health providers and patients, improve a health provider's ability to diagnose and treat patients, and improve real time assistance with clinical decision making.	Partnership with local health authorities, ASHOKA, Foundation Orange Mali, MedEx, Foundation Sanofi Esporis, Tefal and many other international and national agencies.
Child In Need Institute	West Bengal, India	To provide nutritional support to protect children from malnutrition in villages and slum areas in West Bengal, India.	CINI trains health service providers, such as government frontline community health workers.	Mainly people-based healthcare delivery system. But CINI uses mobile phone technology as healthcare delivery tool to improve communications between health providers and patients.	Partnership with national and international agencies and organizations primarily, Government of India and State Governments, UN agencies, international, national and bilateral trusts and foundations, corporates, individuals, Universities and CINI support groups.

Table 6-4 Continued

Program	Country	Mission	Human development	(Mobile) Technology usage	Strategic partnership
Jacaranda Health	Kenya	Jacaranda is a social enterprise aiming to provide affordable, high-quality maternal and child health services to poor urban women.	Training staff nurses to be strong leaders and managers, from handling obstetric emergencies to running clinical case reviews and quality initiatives. Work with expert clinical educators and faculty to design dynamic continuing training for staff nurses that include hard and soft skills.	Jacaranda uses a mobile phone system to improve communication between health providers and patients, client data collection, organization and analysis, send customized health tips and scheduling reminders through SMS, and mobile payment option, MamaKiba (meaning	Partnership with Bohemian Foundation, COMO Foundation, Flora Family Foundation, Johnson & Johnson, Health Workforce Advocacy Initiative, Maternal Health Task Force, The David and Lucile Packard Foundation, Women Deliver and many other national and international agencies.
Aga Khan Development Network eHealth Resource Centre	Pakistan Based	Aga Khan Development Network eHealth Resource Centre drives improvements in access, quality, cost, efficiency and safety of health care through Information and Communication Technologies.	Work with partners to provide an eLearning platform to conduct sessions on Continuous Medical Education, Continuous Nursing Education and special need-based sessions for paramedical staff.	The Aga Khan Development Network eHealth Resource Center uses mobile phone technology to improve a health provider's ability to diagnose and treat patients, improve training or real-time assistance with clinical decision making and to improve data collection, organization, and analysis in order to develop and provide quality healthcare services.	Partnership with national and international agencies and organizations, UN agencies, government, universities and so many others.

Based on analysis of all mHealth models described above, we can pronounce the models and practices adopted by them to provide affordable and quality healthcare services to poorer, unreached and unserved peoples in developing countries. These models are adopted by non-profit organizations from various perspectives. These models are simplified in the table 6-5.

Table 6-5 Healthcare services models and practices adopted by non-profit organizations.

Name of models	Adapting to
BRAC HNPP	Health Services Network and Health Services Innovators
Merrygold Health Network	Social Franchising Health Services Network
Protection de la Famille (ProFam)	Social Franchising Health Services Network
Sun Quality Health Network	Social Franchising Health Services Network
BlueStar Pilipinas	Social Franchising Health Services Network
Health Builders	Health Services Network
Dijantoli	Health Services Network
Child In Need Institute (CINI)	Health Services Chain
Jacaranda Health	Health Services Chain
Aga Khan Development Network eHealth Resources Centre	Health Services Chain and Network

6.2.3 Graphical comparison matrix among mHealth services models

We developed a graphical comparison matrix to compare among healthcare services models as shown in the figure 6-2. The matrix developed based on the models' analysis as presented in the table 6-4. We preferred two dimensions to develop the matrix. One is 'Degree of Human Resource Development for Healthcare Services' and the other is 'Degree of Technology Intervention for Healthcare Services'. The matrix divided into four quadrants and each quadrant described below-

Low human resource development and low technology intervention for healthcare services: This type of initiative taken by organization presents the highest risk to deliver effective and efficient healthcare service delivery in a limited resource context. Healthcare organization could be faced difficulties in both making easy access to healthcare services due to shortage of human resource for health, and also adapting in new technology oriented healthcare services. Low success rate and failure to understand customers' need might happen in healthcare organizations in this segment.

High human resource development and low technology intervention for healthcare services: Low technology intervention in healthcare services significantly

increases work pressure on human resource for health. In addition, healthcare service delivery could slow due to lack of technological intervention in healthcare services. It might be happened imbalance delivery of healthcare services against demand of healthcare services recipients.

High human resource development and high technology intervention for healthcare services: High human resource development and high technology intervention for healthcare services significantly increases the effective and efficient healthcare delivery service in a limited resource context. With these both facilities, healthcare organization could meet the needs of customers' demand regarding healthcare services especially in a limited resource context.

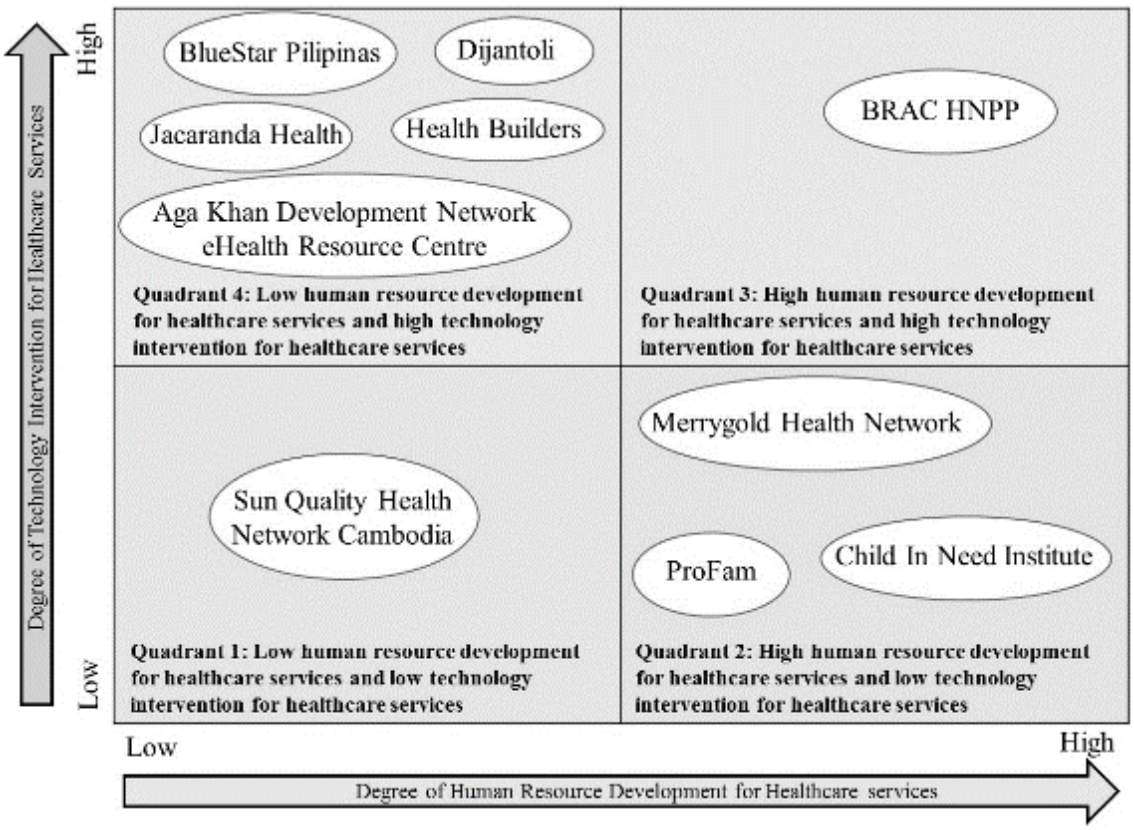

Figure 6-2 Comparison matrix based on 'Development of Human Resource for Health' and 'Technology Intervention for Healthcare Service' among healthcare services models.

Low human resource development and high technology intervention for healthcare services: High technology intervention for healthcare services might reduce the time of healthcare delivery in a limited resource context. Healthcare organization could facilitate services where technological intervention is required, such as healthcare data collection, analysis and decision making. But, healthcare services which's are depended on physical interaction with healthcare service recipients' might happen low success rate there. Therefore, reducing imbalance between human resource development and technological interventions are required.

The BRAC HNPP model is specially characterized by high human resource development and high technology intervention for healthcare services. Human resource for healthcare is seen as the heart of healthcare services. Where there is a severe shortage of human resource for health, there is a need to develop human resource for health for effective and efficient healthcare services delivery. The mechanism which have taken by BRAC HNPP to develop and retain human resource for health is very unique. The mechanism of micro-credit, in one hand, leads to eradicate poverty among community people and given the opportunity to capable themselves through empowerment. On the other hand, when a member of the local community become a community health worker, she can enjoy continuous profit from medicine sells and incentive from various activities. Beside these extrinsic motivations, key opportunities are given to community health workers to provide healthcare knowledge to the peoples in their own community, contribute to the well-being of own society through the healthcare services, and also improving their own social status through empowering themselves. These motivations of community health worker play crucial role and are considered as a factor for sustaining the BRAC HNPP system.

Knowledge transfer is very important for firm's technological progress, overall growth, and renewal. In the knowledge transfer process, technology works as enabler tool that facilitates to transfer knowledge in more efficient and effective way. Therefore, technology interventions in knowledge transfer process facilitates knowledge transfer in several ways. For example, in the BRAC HNPP, healthcare knowledge transfer supported by mobile phone technology facilitates to transfer and disseminate healthcare knowledge among unserved and underserved people in more efficient and effective way. In a limited resource context area, BRAC HNPP successfully established high technology

intervention for healthcare services and transfers healthcare knowledge among slum dwellers. Regarding the healthcare knowledge transfer, mobile technology works as enabler of healthcare knowledge transfer and improves maternal, neonatal, and child health.

In summary, governmental and non-governmental, both organizations depend on human resource management and employee's knowledge transfer capability for their success in marketplace. In one hand, successful human resource management practices bring organizational outcomes positively. On the other hand, employee's knowledge transfer capability facilitates organizational success. Therefore, both human resource management and knowledge transfer enhance the human Well-being together. In this paper, the study used evidence from a case study that how BRAC keep motivating health worker in its system and how BRAC transfer healthcare knowledge to slum dwellers in urban areas. In the study, it has found that human resource management and knowledge transfer has facilitating Well-being output in urban slum areas of Bangladesh. Finally, the study has proposed a dynamic model for transformative healthcare service system in limited resource context.

The findings show that, the influencing factor 'motivation' is mainly facilitating the opportunity to earn money and keep healthcare worker resources in its system in a limited resource context. The system of microcredit has made this possible for those women who are willing to work for income generation from their own household. The system not only giving the opportunity to earn money but also providing the opportunity to learn and diffuse healthcare knowledge among slum dwellers. The implementation of this system in other regions especially in other developing countries who are struggling to transfer or diffuse healthcare knowledge in a limited resource could help to improve Well-being.

The findings and the model may have important implications for more in-depth research and practices in healthcare services regarding healthcare knowledge transfer services to disadvantage people. Furthermore, the study discusses about knowledge transfer and human resource management for health, health outcomes by keeping healthcare workforce in its system and transferring healthcare knowledge that certainly improve Well-being. Overall, findings of the study make it evident that human resource management and knowledge transfer in improving maternal, neonatal, and child health

by making aware, acquire, and apply the transferred knowledge and improving health well-being as well as QoL among slum dwellers.

The study has a few limitations: first, the sample size, while adequate for an exploratory qualitative study, is low. While the findings are interesting and should be vetted against more data, the low sample limits the transferability of findings. Second, for the present study, we didn't interview to end users directly. Future study should focus on there to find customers need and demands in significant. Finally, the model should be applied and tested in deferent healthcare settings either in government or public healthcare services.

Chapter 7 Conclusions, Implications and Limitations

This final chapter of this document will provide the overall conclusion about the work, especially the researches and studies contribution to the body of knowledge. Using the findings of this research, we will reflect in this chapter through answering for research questions, mentioning practical implications, and research limitations. In addition to the overall work it is necessary to show potential directions of future research. After studying scholarly works documented in the chapter 2 and the findings based on empirical studies documented in the chapter 3 and chapter 4, we can come up with answers of subsidiary research questions (SRQs), and then we will combine all to answer the main research question (MRQ).

7.1 Answer for research questions

7.1.1 SRQ 1: What are the key factors affecting to retain human resource for healthcare services in a limited resource context?

The key factors affecting to retain human resource for health are broadly extrinsic

and intrinsic motivations to health workers that facilitate to continue their job. It is hard to imagine retaining human resource for health without any motivation. Thereby, both extrinsic and intrinsic motivations have higher effort on health workers to retain into their employment especially in a limited resource context.

The poverty in a limited resource context which tended to bring health workers into income generating activities. In this situation, BRAC rural development program forms village organization to link rural women with income generating activities and strengthening their capacity for sustainable development. To do so, BRAC rural development program, in a hand, providing micro-credit loan (small loans) to start income generating small business. On the other hand, BRAC HNPP recruiting Shasthya Sebika from village organization group and providing opportunities to generate income in various way. First of all, Shasthya Sebika can purchase medicines and health commodities under micro-credit loan system and sell them to clients in their community for making profit. In addition, Shasthya Sebika get incentives from midwifery services, incentives from patients' identification, incentives from patients' referral system, and also incentives from the participation in training program. All of these are works as extrinsic motivations to retain their job and improve their better performance, resulting improvement of access to healthcare services in rural areas, improving maternal, new born & child health in a limited resource context.

Intrinsic motivations are also important factor that plays important role to retain health workers in their job. As a shsthya sebika of BRAC HNPP, they can access health care services for them and also for their family members without any cost. This kind of motivation doesn't increase their financial income but get a great motivation when they cured. These kinds of motivation have physiological effect on performance and encourage village organization members to become Shasthya Sebika as well as to retain in their provision. Another intrinsic motivation is social recognition which encouraged for becoming Shasthya Sebika and retain in their provision to serve to their community people.

The findings suggested that the variety of motivations are working to encourage village organization members to become Shasthya Sebika and retain in their provision. These are including extrinsic and intrinsic motivations. In a summery, extrinsic motivation means the opportunity to earn money, and the intrinsic motivation means the

opportunity to contribute to the society or community in order to ensure well-being of society or community, and get its reward as psychological satisfaction. Shasthya Sebika in BRAC HNPP made it possible under the micro-credit system and health service provision which are providing such motivations. Thereby, BRAC HNPP ensuring a sustainable supply of human resource for health in areas with limited resources.

7.1.2 SRQ 2: What are the key factors affecting to transfer healthcare knowledge in a limited resource context?

The rise of healthcare disparities due to the severe shortage of human resource for health in a limited resource context has directly affected the improvement of well-being of unreached and unserved populations in urban slum areas. Therefore, provision of healthcare services and transfer healthcare knowledge through the mobile technology can be improved well-being of slum dwellers. But, it is hard to reached to unreached populations with healthcare services and healthcare knowledge where there is a severe shortage of human resource for health. The study shows that the technology factor that facilitating healthcare knowledge transfers in improving slum dwellers well-being. Through the mobile phone, healthcare knowledge can transfer to slum dwellers at any time in anywhere with affordable cost. Therefore, knowledge transfer reduces the number of physical visits and making the opportunity improve service quality. In addition, focal healthcare service provider Shasthya Karmi provides knowledge on family planning, nutrition and sanitation. As a result, slum dwellers getting better improvement on these health issues as well as improving well-being. It is reported that, the more knowledge transfer will be effective to achieve family planning, nutrition and sanitation goal if the more attention will be given to knowledge transfer strategies and implementation.

Training and workshops are the important key factors that affecting healthcare knowledge transfer to slum dwellers in a limited resource context. BRAC HNPP organizes weekly workshop with Shasthya Karmis' and monthly refreshers training with Shasthya Sebika's in their regional offices. This opportunity provides an environment of transfer healthcare knowledge from higher management and technical skilled personnel

to Shasthya Karmi's and Shasthya Sebikas'. During these training and workshops, Shasthya Karmi's and Shasthya Sebika's seeks healthcare knowledge what they cannot provided during their activities of healthcare knowledge transfer to slum dwellers. Therefore, training and workshops are the key important factor that affecting knowledge transfer to slum dwellers in a limited resource context.

Healthcare services in a limited resource context need to be set up with practical strategies and be linked with concepts of knowledge transfer through mobile technology to improve the quality of services. Policy makers and practitioners should think about knowledge transfer through mobile technology that service providers and recipients could adopt with the technological trend in this era of ICT. In addition, mobile technology and knowledge transfer in healthcare services should be integrated to manage the rise of health disparities and the lack of human resource for health.

7.1.3 SRQ 3: How does transformative action improve healthcare services access and well-being in a limited resource context?

From the study findings, the study has identified several transformative actions which is important to improve access to healthcare service and well-being in a limited resource context as well as achieve better healthcare delivery system performance. The findings of the present study show that human resource and technology both have well contribution to facilitate access to healthcare services in rural and urban slum areas where people have not only lack of access to healthcare services but also lack of healthcare knowledge. BRAC HNPP helping to reduce these gaps by retaining their health workers and providing opportunities to Shasthya Sebika to service people in their community. BRAC HNPP providing motivations both extrinsic and intrinsic to Shasthya Sebika. As a result, Shasthya Sebika getting motivations to retain in BRAC HNPP and providing quality of healthcare services and transferring healthcare knowledge to their own community in rural areas. As a result, not saying only by Shasthya Sebika's work performance but with many other service providers, Bangladesh achieves remarkable progress in achieving millennium development goals (MDGs) by 2015, and improving

well-being as well. The continuation of this system could helpful to achieve sustainable development goals (SDGs) and greater well-being in a limited resource context.

In order to improvement of quality of healthcare services and level of healthcare knowledge among slum dwellers, technology intervention in healthcare services and knowledge transfer is required. From this viewpoint, BRAC HNPP equipped their health workers Shasthya Karmi with mobile technology for households' data collection, providing healthcare services remotely and healthcare knowledge transfer among slum dwellers. This transformative action helping to facilitate easy access to healthcare services and more healthcare knowledge transfer provision by reducing the number and time of physical visits. In addition, managers of BRAC HNPP could regulate employees work performance and also could help them in producing new services by analyzing collected data by Shasthya Karmi. Thereby, healthcare knowledge transfers through mobile technology impact on healthcare service implementation and contributing to improve overall access and quality of healthcare services.

7.1.4 MRQ: How to model a transformative service system for healthcare services access in a limited resource context?

Human resource for health is the main actor of healthcare service system. It is hard to think a well-organized and adequate health services without human resource. Unfortunately, in a hand, there are a severe shortage of human resource for health in a limited resource context. On the other hand, it is also becoming difficult to retain human resource for health in a limited resource context due to several reasons including lack of financial package, skilled migration from developing countries to developed countries and lack of motivations that government and non-profit organization offer to them. Therefore, for policy makers, it is important to think how to retain existing human resource for health. Then, it is also important to think how can be utilized properly for better outcomes in healthcare services.

Governmental and non-governmental, both organizations depend on human resource management and employee's knowledge transfer capability for their success in

marketplace. In one hand, successful human resource management practices bring organizational outcomes positively. On the other hand, employee's knowledge transfer capability facilitates organizational success. Therefore, both human resource management and knowledge transfer enhance the human Well-being together. In this paper, the study used evidence from a case study that how BRAC HNPP keep motivating health worker in its system and how BRAC HNPP transfer healthcare knowledge to slum dwellers in urban areas. In the study, it has found that human resource management and knowledge transfer has facilitating Well-being output in urban slum areas of Bangladesh. Finally, the study has proposed a dynamic model for transformative healthcare service system in limited resource context.

The findings show that, the influencing factor 'motivation' is mainly facilitating the opportunity to earn money and keep healthcare worker resources in its system in a limited resource context. The system of microcredit has made this possible for those women who are willing to work for income generation from their own household. The system not only giving the opportunity to earn money but also providing the opportunity to learn and diffuse healthcare knowledge among slum dwellers. The implementation of this system in other regions especially in other developing countries who are struggling to transfer of diffuse healthcare knowledge under limited resources could help to improve Well-being.

The findings and the model may have important implications for more in-depth research and practices in healthcare services regarding healthcare knowledge transfer services to disadvantage people. Furthermore, the study discusses about knowledge transfer and human resource management for health, health outcomes by keeping healthcare workforce in its system and transferring healthcare knowledge that certainly improve Well-being. Overall, findings of the study make it evident that human resource management and knowledge transfer in improving maternal, neonatal, and child health by making aware, acquire, and apply the transferred knowledge and improving health well-being as well as QoL among slum dwellers.

7.2 Research implications

7.2.1 Implication for practice

Our main aim in this study was to address the almost total lack of research evidence on (1) what are the key factors affecting to retain human resource for health in healthcare services in a limited resource context, and (2) what are the key factors affecting transfer healthcare knowledge through mobile technology and enhances well-being of slum dwellers in a limited resource context. The study has done so by directly interviewing and reporting on the key activities of Shasthya Sebika's in rural areas and Shasthya Karmi's in slum areas, with focusing on lack of human resource for health, knowledge transfers through mobile technology and transformative outcomes.

Accordingly, the first major practical contribution of the present study is that it provides much needed empirical evidence on the actual situation of healthcare services and how a non-profit healthcare organization retain their health workforce in their system, what are the key factors affecting transfer of healthcare knowledge and how does transformative action improve access to healthcare services and well-being in a limited resource context. Investigating directly about the activities, career and challenges that Shasthya Sebika's and Shasthya Karmi's are faces during work will allow policy makers, trainers, consultants and others to modelling new services, tools and actions based on Shasthya Sebika's and Shasthya Karmi's actual perceptions. In addition, this finding will allow them to understand where Shasthya Sebika's and Shasthya Karmi's are now in terms of their skill, knowledge and practices. For example, Shasthya Sebika's are not only motivated with extrinsic motivations but also motivated with intrinsic motivations to retain and continue their provision in a limited resource context. Therefore, this will allow policy makers to redesign their motivation strategies. For Shasthya Karmi's, some of them are not well familiar with mobile technology and software how to use and manage it. Therefore, this will allow policy maker and trainers to think not only training and workshops on healthcare services are enough, but also more training and workshops on

management of technology to be needed. Many others could derive similar implications from most findings of this study.

A second important implication of this present study originates from the findings on the uniqueness of the knowledge transfer through mobile technology that carried out Shasthya Karmis' with the help of Shasthya Sebika's as a major part of their duties in slum areas. The findings point to a specific set of capability, information sources and attitude towards healthcare knowledge transfer through mobile technology that evident in improving maternal, neonatal, and child health by applying the transferred knowledge and improving well-being as well as quality of life among slum dwellers. It means, healthcare knowledge transfer through mobile technology would be a greater advantage to achieve SDGs by 2030. Therefore, this evidence will allow policy makers to integrate healthcare knowledge transfer with mobile technology in order to achieve SDGs by 2030 in other regions in a limited resource context.

A third implication stems from the study findings that suggested that, healthcare knowledge transfer through mobile technology could hamper the continuity due unaware of technological knowledge among Shasthya Karmis' and service recipients. This information is important that the findings are supported by the study conducted in a limited resource context and found that technical barriers are still exists in implementation of information and communication technologies for healthcare services (Islam and Tabassum, 2015). Therefore, this evidence will allow policy makers to and practitioners to think about what types of technical training and promotions are needed for Shasthya Karmi's and service recipients to make them familiar with new technology that intervene with healthcare services in a limited resource context.

Finally, the present study introduced a transformative healthcare service system model through investigation to policy makers and practitioners after reviewing a number of mobile technology based healthcare service system models in a limited resource context. As of my knowledge, modelled for the first time, transformative healthcare service system model will allow them to incorporate with their existing facilities in order to transfer healthcare knowledge to disadvantage populations.

7.2.2 Implication for future research

The study, being of an exploratory qualitative in nature, rises a number of opportunities for future research, both in terms of theory development and concept validation. More research will be necessary to improve and further elaborate the novel findings of this study in other areas in a limited resource context.

First, while the study generated a number of empirical evidences, given the snowball sampling strategies focused on factors that affecting to retain and efficiently utilizes healthcare workforce in a non-profit organization. But, very little can be said of the strategies and factors of others for-profit, non-profit and government organizations in a limited resource context. Thus, the present study could be extended in examine of statistical in a boarder range of sampling rather than analytical, descriptive that the study has done here.

Second, the present study offers the opportunity to apply and validate the transformative service system model which developed based on empirical investigation at BRAC HNPP in other regions or countries in a limited resource context. In addition, the study could be extended to validate its transformative outcomes of well-being in another region.

7.3 Limitations of the study

The research focuses on identifying factors affecting to retain human resource for health and healthcare knowledge transfer based on mobile technology in a limited resource context. Finally, a transformative healthcare service system model has been developed based on the investigation of BRAC HNPP in Bangladesh. Based on the different healthcare service system model, the developed model and related analysis from the viewpoint of human resource management, knowledge transfers and technological supports in healthcare knowledge transfers that support to improve well-being of

populations in rural and slum areas of Bangladesh. The nature of the study and the choice of methodological design not only strengthened the study findings, but also unavoidably have some of its limitations. These limitations are including the following:

While the investigation of the study allowed to gain knowledge, insights and activities of Shasthya Sebikas' and Shasthya Karmis', the investigation focus on Shasthya Sebika's and Shasthya Karmi's activities regarding healthcare services and key factors that affecting to retain human resource for health and knowledge transfer practices through mobile technology were investigated only from their individual perspectives. Accordingly, although the study often investigated and reported the mobile technology as a key factor which affecting healthcare knowledge transfer as well as improving well-being of slum dwellers. But, the study could not have investigated service recipient's (rural and slum residence) needs and demands in significant. The study suggested that this topic would strongly benefit from future empirical investigation to transfer specific knowledge on healthcare services in a limited resource context.

The target population of this study was only Shasthya Sebika's and Shasthya Karmi's who are the frontline health workers of a non-profit organization of BRAC HNPP. The scope of the study is limited to healthcare workers in specific regions in Bangladesh. They have played a significant role for supporting healthcare knowledge transfer through mobile phone technology. Therefore, more in-depth from the viewpoints of service recipients and as well as from policy makers in other regions in a limited resource context of the world would strongly benefit from future investigation.

Finally, as the model developed based on findings from BRAC HNPP and situations of healthcare service system in a specific region in Bangladesh. Future research could enhance access to healthcare services and improving well-being of populations living in a limited resource context by applying this model in the other part of regions where peoples are unreached and unserved or underserved.

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Appendices

Appendix A: Questionnaire set 1 (Shasthya Sebika Side)

Factors affecting to retain human resource for heath in BRAC HNPP.

Part 1: General Information of respondents.

1 Age

☐ 15-20 years old ☐ 21-25 years old ☐ 26-30 years old

☐ 31-35 years old ☐ 36-40 years old ☐ 41-50 years old

☐ 51-55 years old ☐ 56-60 years old ☐ > 61 years old

2 What is your current marital status?

☐ Single ☐ Unmarried ☐ Divorced

☐ Widowed ☐ Would rather not say

3 Education (……years of schooling experience)

☐ 1-5 years (Primary) ☐ 6-10 years (Secondary)

☐ 11-12 years (higher secondary) ☐ 13-16 years (Bachelor's)

4 Duration of provision (Service Period)

☐ 1-5 years ☐ 6-10 years ☐ 11-15 years

☐ 16-20 years ☐ > 21 years

5 Household visits per month

☐ 100-150 Units/ month ☐ 151-200 Units/ month ☐ > 301 Units/ month

☐ 201-250 Units/ month ☐ 251-300 Units/ month

Appendix B: Questionnaire set 2 (Shasthya Karmi Side)

Factors affecting to healthcare knowledge transfers and improving well-being for slum dwellers in a limited resource context.

Part 1: General Information of respondents

1 Age

☐ 15-20 years old ☐ 21-25 years old ☐ 26-30 years old

☐ 31-35 years old ☐ 36-40 years old ☐ 41-50 years old

☐ 51-55 years old ☐ 56-60 years old ☐ > 61 years old

2 What is your current marital status?

☐ Single ☐ Unmarried ☐ Divorced

☐ Widowed ☐ Would rather not say

3 Education (……years of schooling experience)

☐ 6-10 years (Secondary) ☐ 11-12 years (higher secondary)

☐ 13-16 years (Bachelor's) ☐

4 Duration of provision (Service Period)

☐ 1-5 years ☐ 6-10 years ☐ 11-15 years

☐ 16-20 years ☐ > 21 years

5 Number of Shasthya Sebika under your sup

☐ 1-5 Shasthya Sebika ☐ 6-10 Shasthya Sebika

☐ 11-15 Shasthya Sebika ☐ 16-20 Shasthya Sebika

Part 2: Contents of work

6 a. Would you please tell me about your work?

b. How long have serving to BRAC health program?

c. Have you felt any difficulties during contact with patients in slum areas?

d. Types and duration of training (including mHealth training) that you have received from BRAC?

	Type of Training	Duration of Training

e Would you please tell me about your work?

f Have you felt any difficulties during contact with patients in your community?

g Do you respond to the patients when the need your support?

h Did you get any healthcare training from BRAC?

i If so, what kind of training and how long? Is that an effective or not?

j Do you keep patients records during consultancy? If yes, how do you keep patients' records?

Appendix C: Original outputs from co-occurrence analysis

Table: Original outputs from co-occurrence analysis

Noun		ProperNoun		TAG		PRP		Adj		Adv		Verb		W	
community	29	BRAC	7	shasthya_sebika	47	I	136	curious	4	therefore	11	be	61	when	4
people	22	Organization	2	shasthya_karmi	9	my	60	other	4	now	9	become	22	that	2
housewife	20	Village	2	BRAC_HNPP	2	they	8	good	3	not	5	have	17	how	1
income	16	Family	1			we	6	new	3	so	5	work	16		
work	15	Law	1			he	4	own	3	later	4	decide	14		
family	13	Muslim	1			it	3	aware	2	very	4	ask	8		
healthcare	10	Right	1			she	2	easy	2	also	3	do	7		
health	8	School	1					financial	2	well	3	know	7		
job	8	Social	1					important	2	enough	2	help	6		
service	5	Whenever	1					most	2	more	2	provide	6		
society	5							poor	2	moreover	2	accept	5		
time	5							annoyed	1	only	2	get	5		
training	5							basic	1	suddenly	2	join	5		
anything	4							certain	1	then	2	support	5		
house	4							co-operat	1	about	1	take	5		
madam	4							education	1	actually	1	think	5		
member	4							effective	1	ago	1	earn	4		
money	4							eldest	1	always	1	learn	4		
profession	4							few	1	as	1	benefit	3		
thing	4							fine	1	exactly	1	come	3		
offer	3							healthy	1	here	1	generate	3		
problem	3							helpful	1	ill	1	increase	3		
source	3							human	1	important	1	choose	2		
birth	2							husband?s	1	much	1	contribute	2		
didn?ft	2							interested	1	right	1	enjoy	2		
difficulty	2							jobless	1	simply	1	feel	2		
household	2							many	1			find	2		
husband	2							particular	1			improve	2		
information	2							personal	1			keep	2		
learning	2							present	1			like	2		
other	2							prospectiv	1			make	2		
reason	2							rural	1			need	2		
share	2							safe	1			receive	2		
teacher	2							several	1			serve	2		
addition	1							terrible	1			teach	2		
adult	1							unemploy	1			want	2		
association	1							unknown	1			affect	1		
attendant	1							win-win	1			concern	1		
awareness	1											cover	1		
benefit	1											didn?ft	1		
child	1											don?ft	1		
children?fs	1											encounter	1		
condition	1											encourage	1		

Table: Continued

Noun		ProperNoun		TAG		PRP		Adj		Adv		Verb		W	
crisis	1											fall	1		
curiosity	1											finish	1		
day	1											focus	1		
decision	1											haven?ft	1		
disease	1											look	1		
doctor	1											lose	1		
earnings	1											meet	1		
education	1											motivate	1		
everything	1											overcome	1		
example	1											permit	1		
expense	1											recruit	1		
experience	1											reduce	1		
help	1											see	1		
honour	1											solve	1		
idea	1											start	1		
image	1											stop	1		
knowledge	1											sufferer	1		
labourer	1											talk	1		
leader	1											use	1		
microfinance	1											walk	1		
mother	1														
mother-in-law	1														
opinion	1														
opportunity	1														
order	1														
organization	1														
patient	1														
physician	1														
pregnancy	1														
qualification	1														
recognition	1														
risk	1														
side	1														
situation	1														
son	1														
treatment	1														
volunteer	1														
woman	1														
worker	1														
year	1														